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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

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LYING ABOUT POLYGRAPH TESTS

The Pseudoscience of Lie Detection

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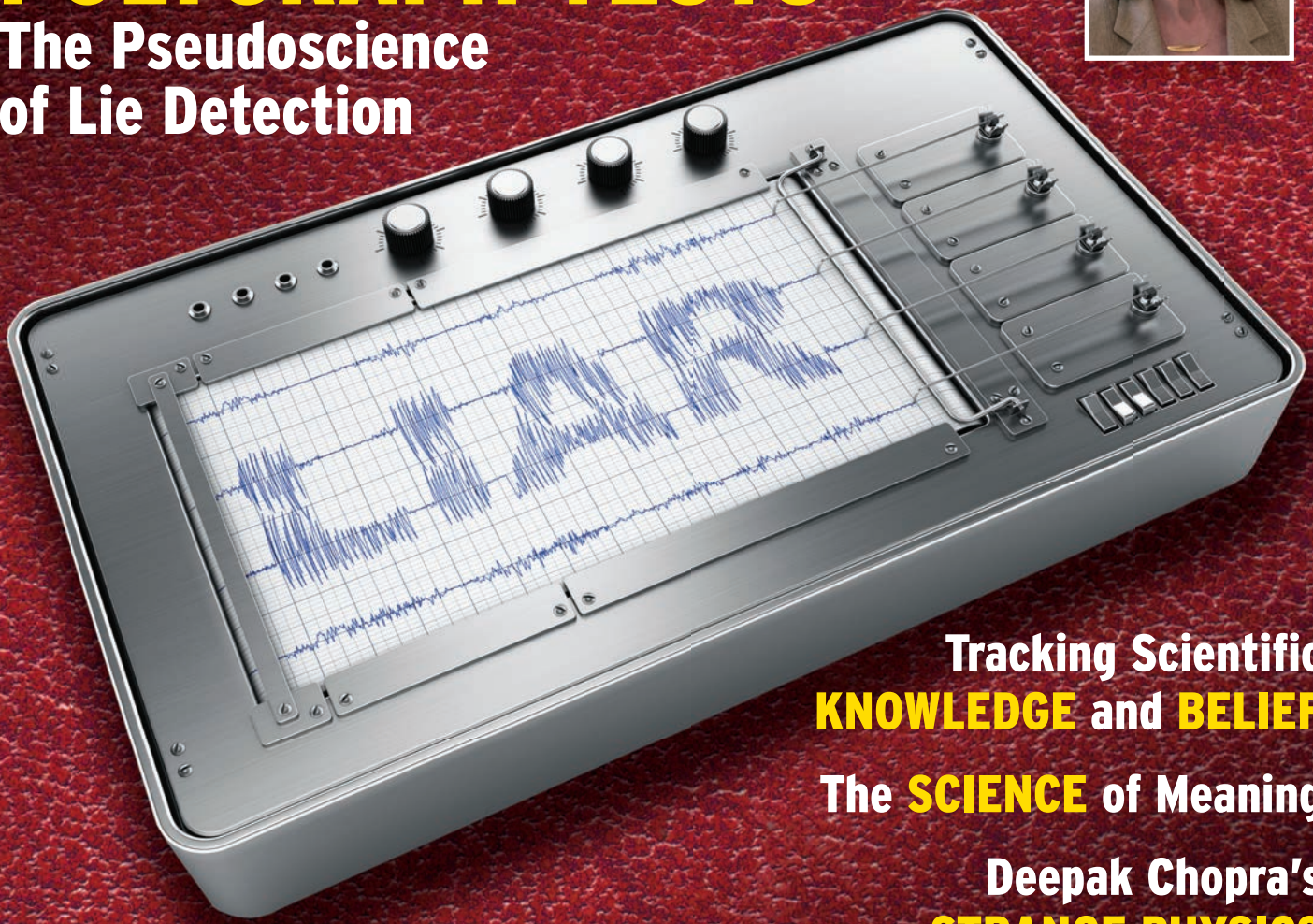
ILLUSIONS of Memory



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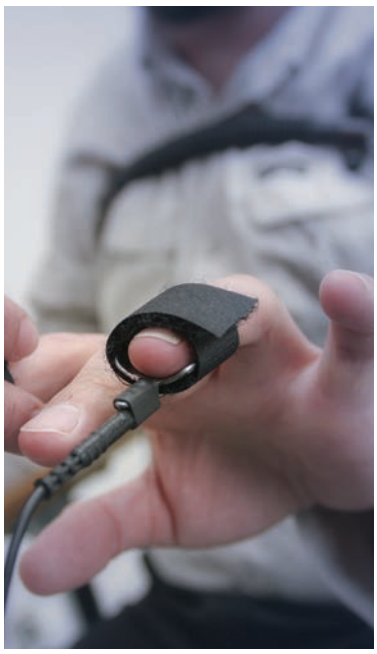

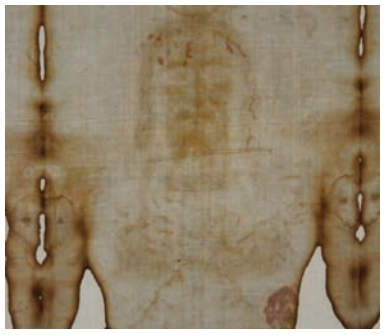

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Committee for Skeptical Inquiry
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[FROM THE EDITOR

Do We *Really* Want Science-Informed Candidates?

The 2016 American presidential campaign has been in full swing for what seems like a year already, with most of another year still to go. Politicians, pundits, and the public have had ample opportunity to vent all their frustrations at their opponents' political views and the political system itself. But many science-minded people at this point in the campaign share a different sort of frustration: Why don't the candidates talk about any science-related issues? Why don't their media questioners even ask them about such things?

About half of all public policy issues have some science or technology content, but political candidates seldom have much familiarity with science. This brings to my mind Carl Sagan's famous lament: "We live in a society absolutely dependent on science and technology and yet have cleverly arranged things so that almost no one understands science and technology. That's a clear prescription for disaster." (Another version of this famous quote appeared in Sagan's Skeptical Inquirer article "Why We Need to Understand Science," Spring 1990: "We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology.")

Why don't the candidates talk about any science-related issues? Why don't their media questioners even ask them about such things?

According to a Zogby online national poll conducted in September and released in October by Research!America and ScienceDebate.org (http://sciencedebate.org/Poll2015), most American voters (87 percent) say it is important that candidates for President and Congress have a basic understanding of the sciences informing public policy issues. This view is held across the spectrum of political affiliation (92 percent of Democrats, 90 percent of Republicans, and 79 percent of Independents).

Nevertheless, the poll found that less than half (45 percent) of Americans say they are well informed about the positions of current presidential candidates about public policies and public funding for science and innovation.

The poll found that a majority of Americans (77 percent) say that public policies should be based on the best available science (82 percent of Republicans, 81 percent of Democrats, and 68 percent of Independents) and 84 percent of Americans agree that science should not be partisan—not the sole business of one political party or another (87 percent of Republicans, 83 percent of In-

[Continued on p.12]

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Although the polygraph can be useful in coercing confessions, it is based on scientifically implausible assumptions of accuracy and is biased against the innocent. The scientific community justly considers it pseudoscience, and it should be abandoned.
See page 36.

What Exxon Knew About Arctic Warming Twenty-Five Years Ago

Kendrick Frazier

A major new investigation thoroughly documents how a big oil company's executives were publicly minimizing the effects of climate change in the Arctic while its own scientists were studying those impacts and concluding they would be significant.

The events began more than a quarter century ago, when it was becoming apparent that global warming would warm the Arctic regions even more so than other parts of the planet. Big oil companies have major stakes in the Arctic, and they needed to know the impacts of climate change on their operations.

In 1990 the board of Exxon, one of the world's largest oil companies, responded to a dissident shareholder by saying Exxon had studied the science of global warming and concluded it was too murky to warrant action. It said its examination "supports the conclusions that the facts today and the projection of future effects are very unclear."

Yet in far northern Canada's Arctic frontier, researchers and engineers at Exxon and Imperial Oil were quietly incorporating climate change projections into the company's planning and studying how to adapt their operations for a warming planet.

This "gulf between Exxon's internal and external approach to climate change from the 1980s through the early 2000s" is illuminated in a review over the last year of hundreds of internal documents, decades of peer-reviewed published material, and dozens of interviews. The Energy & Environmental Reporting Project of the Columbia University Graduate School of Journalism and the *Los Angeles Times* carried out the investigation. The first article reporting these results began on the front page of the Sunday, October 11, 2015, *Los Angeles Times* and extended over two inside pages. Bylined reporters were Sara Jerving, Katie Jennings, Masako Melissa Hirsch, and Susanne Rust. An eight-month investigation by InsideClimateNews.org titled "Exxon's Own Research Confirmed Fossil Fuels' Role in Global Warming Years Ago" and issued online September 15 came to similar conclusions.

Documents were obtained from the Imperial Oil collection at Calgary's Glenbow Museum and the ExxonMobil Historical Collection at the University of Texas at Austin's Briscoe Center for American History. The reporters also interviewed dozens of experts, including former ExxonMobil employees.

"We considered climate change in a number of operational and planning issues," said Brian Flannery, Exxon's in-house climate science advisor from 1980 to 2011. In an interview, he described the company's internal effort to study the effects of global warming as a competitive necessity. "If you don't do it and your competitors do, you're at a loss."

Ken Croasdale, senior ice researcher for Exxon's Canadian subsidiary at the time, was leading a Calgary-based team of researchers and engineers in 1990 that was trying to determine how global warming could affect Exxon's Arctic operations and its bottom line. "Certainly any major development with a life span of say 30–40 years will need to assess the impacts of potential global warming," Croasdale told an engineering conference in 1991. "This is particularly true of Arctic and offshore projects in Canada, where warming will clearly affect sea ice, icebergs, permafrost, and sea levels."

From 1988 to 1992, Croasdale's team looked at both positive and negative effects of a warming Arctic and reported their findings to Exxon headquarters in Houston and New Jersey.

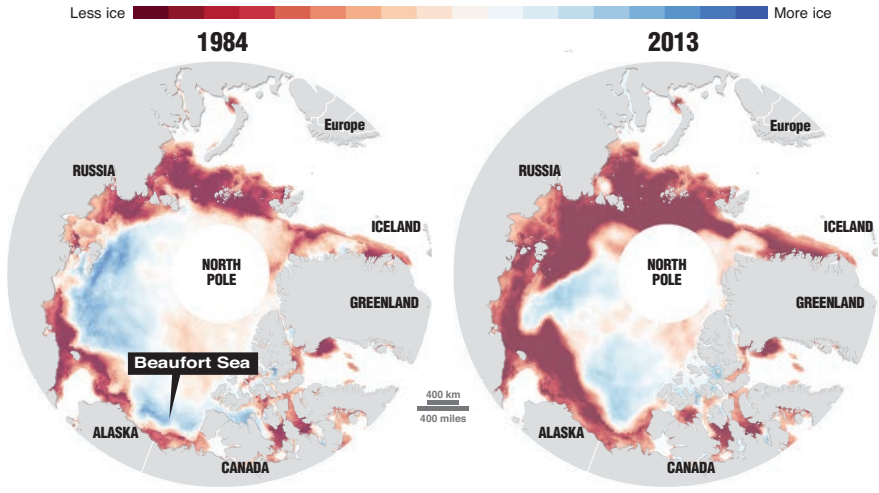
They noted the good news that "potential global warming can only help lower exploration and development costs" in the Beaufort Sea. But they also noted that it posed hazards, such as higher sea levels and bigger waves, and that the thawing permafrost could be trouble for processing plants and pumping facilities as well as pipelines.

At the same time these impacts were being studied and reported to management, Exxon and its worldwide affiliates were crafting a public policy position that sought to downplay the certainty of global warming.

That the Arctic was likely to be most affected by global warming was backed by models built by Exxon scientists and others such as Marty Hoffert, a New York University physicist. Their work, published in 1984, showed that global warming would be most pronounced near the poles. (The article doesn't say so, but one of several reasons for this is that melting of highly reflective ice

Changes in Arctic sea ice from 1984 to 2013

Thinning sea ice cover due to climate change was a major factor in Exxon's strategic planning for oil and natural gas exploration in the Beaufort Sea. Here's a comparison of September deviations from average ice concentrations in 1984 and 2013, using NASA satellite data:



Sources: National Snow and Ice Data Center

Graphic: Los Angeles Times/TNS

leads to a positive feedback in which the darker soil or water exposed underneath absorbs more solar heat, leading to still more melting, and this cycle continues.)

Between 1986 and 1992, when he left the company, Croasdale's team used the global circulation models developed by the Canadian Climate Center and NASA's Goddard Institute of Space Studies to anticipate how climate change would affect the company's Arctic operations.

The article notes that "these were the same models that—for the next two decades—Exxon's executives publicly dismissed as unreliable and based on uncertain science." Chief Executive Lee Raymond told an annual meeting in 1999 that future climate "projections are based on completely unproved climate models, or, more often, on sheer speculation."

Yet the models were "spot on," the newly published investigation concludes. As predicted, the Beaufort Sea has experienced some of the largest loss of sea ice in the Arctic, and its open water season has increased significantly, according to Mark Serreze, a senior researcher at the National Snow and Ice Data Center in Boulder, Colorado.

Today, as Exxon's own scientists predicted twenty-five years ago, Canada's Northwest Territories has experienced some of the most pronounced effects of a warming planet, the article notes. While the rest of Earth has seen an average increase of roughly 1.5 degrees in the last hundred years, the northern reaches of the province have warmed by 5.4 degrees, and temperatures in central regions have warmed by 3.6 degrees.

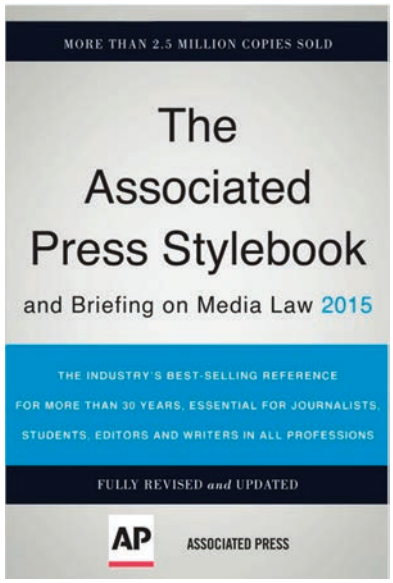
ExxonMobil declined to respond to the reporters' requests for comment on what steps it took as a result of its scientists' warnings.

The *Times* said the October 11 article, which is online at http://graphics.latimes.com/exxon-arctic/, is the first in a series of occasional articles reporting on "the gap between Exxon Mobil's public position and its internal planning on the issue of climate change."

Kendrick Frazier is editor of the Skeptical Inquirer.

AP Stylebook Decision on Climate Denial Terms Follows CSI Fellows Guidance . . . Up to a Point

Kendrick Frazier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In December 2014, our Committee for Skeptical Inquiry issued a now-famous statement calling on news media to stop conflating the terms *denier* and *skeptic*. It said *skeptics* is an honored term that should be reserved for those who are guided by scientific evidence; those who regularly deny good science about climate change should not be allowed to misappropriate a term that scientific skeptics have long used in critiquing pseudoscience and encouraging good science.

The statement, "Deniers Are Not Skeptics" (online at csicop.org and published in the March/April 2015 Skeptical Inquirer, p. 8), was initially signed by forty-eight fellows of the Committee (now fifty-eight, see box), and it generated worldwide discussion and comment.

Now there is a significant tangible result of that statement. The Associated Press announced on September 22 that it had updated its guidance about global warming terminology in its stylebook. The AP Stylebook is widely used by news organizations and journalism educators for guidance on consistency of style and language. In its new guidance, AP said it will no longer use the term *skeptics* for those who reject the findings of climate science.

That much was a decided victory for CSI and its group of distinguished scientists, scholars, and investigators who signed the statement—and for climate scientists generally who long had bristled at opponents of climate science calling themselves "skeptics."

The reason for the move was well cited in the *AP Definitive Resource*, which reports on edits to the AP Stylebook:

> Scientists who consider themselves real skeptics—who debunk mysticism, ESP and other pseudoscience, such as those who are part of the Center [actually Committee] for Skeptical Inquiry—complain that non-scientists who reject mainstream climate science have usurped the phrase skeptic. They say they aren't skeptics because "proper skepticism promotes scientific inquiry, critical investigation and the use of reason in examining controversial and extraordinary claims." That group prefers the phrase "climate change deniers" for those who reject accepted global warming data and theory.

CSI scientists behind the statement were pleased that the AP had decided at least to stop calling opponents of climate science "skeptics."

But it was a second part of AP's stylebook decision—not to call deniers "deniers"—that caused a firestorm of controversy and criticism.

For the AP Stylebook also recommended in its update that instead of *deniers*, journalists use the terms *climate change doubters* or *those who reject mainstream climate science*. The

latter six-word phrase is the more accurate, it noted; but it acknowledged that the shorter term would have more appeal.

The reason for that part of the stylebook change? Well, its because climate science deniers don't like being called "deniers." Specifically, said the AP:

> Those who reject climate science say the phrase *denier* has the pejorative ring of Holocaust denier so The Associated Press prefers *climate change doubter* or *someone who rejects mainstream science*.

That unfortunately plays right into the hands of those who reject mainstream climate science (to use the AP's accurate term). It has long been a weak argument of opponents of climate science that "deniers" is associated with the Holocaust and therefore should not be used for them. But SI and other skeptic organizations have long used the term to apply to other denialisms such as "moon-landing deniers," "AIDS/HIV deniers," and "vaccine deniers." Precision of language should trump political correctness.

For the record, the CSI statement made no recommendation about what to call those who deny climate science. It just didn't want them to be called "skeptics."

Ronald A. Lindsay, president and CEO of the Center for Inquiry, of which the Committee for Skeptical Inquiry is a program, was one of the first to criticize that part of the AP decision.

> The AP's journalism is read throughout the world, and heavily influences issues such as climate change. Referring to deniers as "doubters" still imbues those who reject scientific fact with an intellectual legitimacy they have not earned. The general public, we fear, will still not get a clear picture of which public figures are basing their positions on reality, and which are not.

Noted climate scientist Michael Mann expressed similar criticism: "Those who are in denial of basic science, be it evolution or human-caused climate change, are in fact science deniers. To call them anything else, be it 'skeptic' or 'doubter,' is to grant an undeserved air of legitimacy to something that is simply not legitimate."

Pages of online links to similar criticisms of that part of the AP change can be found in an online search.

But in a piece at *Huffington Post* on the change, physicist and CSI Fellow Mark Boslough, who spearheaded the CSI statement, was more generous. He said he was surprised and delighted with the AP decision. "As a skeptic and a scientist, I have been bothered for many years by the way the word 'skeptic' was co-opted by individuals who are anything but skeptical when it comes to using evidence to test unusual and extraordinary claims. . . ." Said Boslough:

CSI scientists behind the statement were pleased that the AP had decided at least to stop calling opponents of climate science "skeptics."

> My first tweet was a strong and unequivocal thank-you to the AP and to their science journalist Seth Borenstein for giving us our good name back. I thought the adoption of the word "doubter" to replace "denier" seemed a little weaselly, but the restoration of "skeptic" was such a glorious win for our camp that it wasn't even worth mentioning. . . . By contrast, many of my colleagues and friends in the blogger community went after AP with a level of criticism I did not anticipate. I maintain that this is not a hair-on-fire crisis. Two steps forward and one step back is still a step forward. . . . Clearly this is a win for skeptics.

Statement Has Now Been Signed by Fifty-Eight Fellows

The number of Fellows of the Committee for Skeptical Inquiry who have signed the statement "Don't Call Deniers Skeptics" has risen to fifty-eight.

In addition to the forty-eight signers listed in the original announcements, these CSI Fellows have now signed:

Thomas R. Casten

Willem Betz

Steven Novella

Richard Dawkins

Stephan Lewandowsky

Naomi Oreskes

James L. Powell

Stuart Vyse

Donald Prothero

John Cook

In addition, four CSI Scientific Consultants have asked to sign the statement: Luis Alfonso Gámez, Felix Ares de Blas, John R. Mashey, and Julia Offe.

The full list is now online at http://www.csicop.org/news/show/deniers_are_not_skeptics.

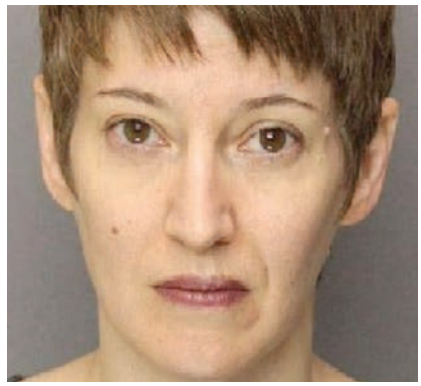
Facilitated Communication Consent Claimed in Sexual Assault Trial

Benjamin Radford

A Rutgers-Newark professor was accused of sexually assaulting a disabled man. During her September 2015 trial, she claimed that she and the alleged victim were in a romantic and sexual relationship despite his (apparent) inability to communicate. Prof. Anna Stubblefield claims that the man, identified as D.J. who has cerebral palsy, consented to sex through the long-discredited technique facilitated communication (FC). As NewJersey.com reporter Bill Wichert noted:

> The state's experts have said the 34-year-old man, known as D.J., is unable to speak and has intellectual and physical disabilities, but Stubblefield claimed "he wasn't intellectually impaired at all," and that he could communicate by typing on a keyboard with her assistance. "None whatsoever," Stubblefield said when her attorney asked if she had any doubts about whether the relationship was consensual. "Because I knew he was the one who was saying everything that he typed." As they became romantically involved, Stubblefield said "it was initiated on both sides," and they made sure each other "was good with what was happening." She referred to their romance as "just a regular relationship." (http://tinyurl.com/o2bp47x/)

In the 1980s, many parents of autistic children turned to facilitated communication, which had been claimed to help autistic individuals, and especially children, to communicate. The technique is based on the idea that an autistic child's inability to communicate is caused not by a brain disorder but instead a muscular or nerve disorder that prevents them from producing speech. (Stubblefield claims that is the case with D.J., though his doctors state that he is not just physically but also mentally impaired.) In *50 Great Myths of Popular Psychology*, Scott O. Lilienfeld, Steven Jay Lynn, Barry Beyerstein, and John Ruscio describe



Prof. Anna Stubblefield

Facilitated communication shown in a 1993 PBS documentary

facilitated communication:

> In the early 1990s, shortly after FC was introduced to the United States, scores of enthusiastic facilitators reported astonishing success stories of previously uncommunicative autistic individuals typing out eloquent sentences, at times speaking of their sense of liberation upon at last being able to express their imprisoned feelings. Yet numerous controlled studies soon showed that FC was entirely a product of unintentional facilitator control over autistic children's hand movements. Without even realizing it, facilitators were leading children's fingers to the keys.

In other words, the words and messages were coming from the facilitators—those holding the patients' hands, wrists, and fingers—who were unconsciously typing out what they thought the patient might express if he or she could. While many of the false messages were harmless or heartwarming (such as poetry and appreciative notes to caregivers), others described threats or even sexual abuse that never occurred. In fact in 2014, facilitated communication played a key role in the murder of an eight-year-old autistic boy. Manhattan millionaire Gigi Jordan admitted to killing her son with a lethal dose of medications in February 2010, but she claimed she did it to spare him from sexual abuse at the hands of her ex-husband. Since her son, like D.J., was unable to verbally communicate because of his disability, Jordan used FC to, she believed, communicate with him. Police investigated her complaints and found no evidence of any abuse. Nevertheless, Jordan was convinced that her son would not lie to her about such a thing and decided to kill him instead of exposing him to more abuse. Jordan was found guilty in November and sentenced to eighteen years in prison.

In 2014, facilitated communication played a key role in the murder of an eight-year-old autistic boy.

Prof. Stubblefield's trial raises thorny legal questions about when and how disabled adults can consent to sexual activity, as well as the nature of D.J.'s impairment. If, as seems to be the case, Stubblefield genuinely believes in the validity of facilitated communication—the bulk of scientific evidence notwithstanding—then the jury may be left with a difficult question of whether to convict her of sexual assault even though she genuinely believed she had consent.

Benjamin Radford is the deputy editor of the Skeptical Inquirer.

SI Vindicated in Questioning Turin Shroud Claims

Joe Nickell

The Shroud of Turin.

Over a decade ago in the pages of Skeptical Inquirer (July/August 2004 and May/June 2005), a controversy erupted concerning some claims by Turin Shroud proponent Ray Rogers. He had purported to show that radiocarbon tests of the linen—dating it to between 1260 and 1390 and thus revealing it to be a fake—were invalid because, he hypothesized, the samples came from a "medieval patch." In some detail, I suggested his claims were "cut from whole cloth."

There were several issues, but Rogers's key evidence was his analysis of two pyrolysis spectra that showed a difference between the area selected for C_{14} testing and the rest of the cloth. Some shroud proponents had previously postulated that the C_{14} sample must have come from a patch. Since this apparently could not be seen by those who cut the samples, it must have been done by "invisible reweaving." I challenged these claims on the basis of much other, better evidence. (Sadly, Rogers died while our last exchange was still in press.)

But now, three Italian chemists have published a paper in *Thermochimica Acta* (617 [2015]: 169–171), the same scientific journal that published Rogers's original paper, concluding (as expressed in the paper's title) that "There Is No Mass Spectrometry Evidence That the C14 Sample from the Shroud of Turin Comes from a 'Medieval Invisible Mending.'" The chemists—Marco Bella, Luigi Garlaschelli (a CSI fellow), and Roberto Samperi—found that the differences Rogers detected between the samples were due to contamination ("a contaminant with a long aliphatic chain"). Except for that, "the two pyrolysis-mass spectra look alike rather than different." The scientists concluded that, therefore, the "pseudoscientific theory" that the C_{14} sample might have come from a medieval patch remains unsupported by the evidence.

Rogers's claims were among many others that were offered by shroud partisans hoping to discredit the C_{14} results. However, the tests were conducted by three top laboratories that purified the samples, tested them "blind," and utilized controls from ancient cloths of known age. The results were impressively convincing and were in agreement with the shroud's lack of provenance before about 1357 when, according to a later bishop's report, an artist confessed he had "cunningly painted" its body and blood images. The world-famous microanalyst Walter McCrone found that these consisted of pigments and tempera paint.

Joe Nickell, PhD, is the Committee for Skeptical Inquiry's senior research fellow and author of numerous books, including *Inquest on the Shroud of Turin.*

Dick Smith Receives High Award in Australia

Dick Smith, a longtime fellow of the Committee for Skeptical Inquiry and patron of the Australian Skeptics, has been awarded the Companion of the Order of Australia (AC) in the recent Queen's Birthday honors list.

The AC is awarded for eminent achievement and merit of the highest degree in service to Australia or to humanity at large. Apart from the recently re-instituted Knight and Dame awards, the AC is the highest Australian award that can be issued to an individual, reports *The Skeptic* (Australia).

Smith (see "The Planetary Adventures of Australia's Dick Smith," SI, March/April 2015) is an entrepreneur, publisher, skeptic, round-the-world aviator, and spokesman for a variety of causes protecting the planet and its people.

Picture: JAMES BRICKWOOD

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Satanic Panic Redux: Police Suggest Florida Killings Linked to Witchcraft

Benjamin Radford

A triple homicide in Florida in July 2015 was suspected to be a "Wiccan ritual killing," according to a sheriff's office. A seventy-seven-year-old woman, Voncile Smith, was found dead along with her two sons. It was a gruesome scene. All three had their throats slashed; Smith and one of her sons died from blunt force trauma (such as a hammer blow) and the second son was shot in the head.

As NBC News reported:

> The three victims, all from the same family, were found after a welfare check on Friday, July 31, said Escambia County Sheriff's Office spokesman Sgt. Andrew Hobbes: "It appears that this might be connected to some type of Wiccan ritual killing and possibly tied to the blue moon."...When asked how the evidence suggests these are ritualistic or Wiccan killings Sgt. Hobbes said, "The injuries to the victims, the positions of the bodies and also the person of interest right now is also a practitioner." (http://tinyurl.com/qjjn9t4)

Many modern witches follow a practice called Wicca, which was recognized by a 1986 court decision as a religion. Wiccans—like Christians, Muslims, and followers of most religions—believe in magic, but the magic they practice has little or nothing to do with Satan. Wiccans worship a universal power divided into two parts, the god and the goddess. Wiccan witches do not worship—or even recognize—the Satan of Christian theology. Since their pagan worldview doesn't include a devil, they don't worship him or make sacrifices to him. While it's possible that the killer happened to be Wiccan, there's really no such thing as a "Wiccan ritual killing."

Some scholars lambasted the sheriff's office for linking ritual murders to pagans. The Escambia County Sheriff's Office is not the first to confuse Wiccans for Satanists; the imagined link between witches and the devil emerged during the Middle Ages. Brian P. Levack, a history professor at the University of Texas at Austin, noted in his book *The Witch-Hunt in Early Modern Europe*:

> At the center of most learned witch beliefs was the Devil, the source of the witches' magic, the partner with whom they colluded, and the object of their adoration.... As Christianity, the Kingdom of Christ, spread throughout the East and the West, it was only natural that the Church fathers would consign the religions with which they were competing, both Jewish and pagan, to the Kingdom of Satan.

Thus today's link between witches and Satan can be traced directly back to centuries-old Christian theology that assumed anything non-Christian must by default be Satanic.

Similarly, many fundamentalist Christians mistakenly believe that Halloween has Satanic or otherwise sinister origins. In fact, it traces back to early Celtic celebrations, which, though pagan, have nothing to do with evil or Satan and in fact predate the idea of a Christian devil.

Nonetheless, the belief remains and in some cases has influenced police interpretations of crime scene evidence. Indeed, this is not the first time that seemingly mysterious killings have been attributed to witches. A pony found in Dartmoor, England, in July 2013 was found seemingly mutilated and with several of its organs missing, which fueled speculation that it was killed in some sort of satanic or pagan ritual sacrifice. A livestock protection officer speculated that "witches or devil worshipers" were responsible for the killing, but it was later discovered that the pony had died of natural causes and the mysterious "mutilation" and missing organs were the result of ordinary scavengers. There never were any pony-killers, Satanist or otherwise, simply animals picking at the corpse.

In the West Memphis Three murder case publicized in documentaries such as the *Paradise Lost* series and Peter Jackson's *West of Memphis*, three Arkansas teenagers were convicted of the 1993 murders of three boys, initially claimed by police as having occurred during a Satanic ritual. Later evidence showed that the three convicted men were likely innocent and that the apparent castration of one of the victims—which had been mistaken by police as indicating a link to a Satanic ritual—was in fact the result of animals feeding on the body before it was discovered.

What about the seemingly spooky fact that the Florida murders were linked to the blue moon, as the Sheriff's department claimed? It might be pure coincidence, since other unrelated homicides were also committed that same night in other areas across the country. Or it might have had some significance to the lunar phase.

In fact, there's no need to wonder because according to authorities the victims were killed on July 28, and the blue moon occurred on July 31—the day the family was discovered during a welfare visit. Since the triple murder could potentially have been discovered minutes or hours after the crime, there's obviously no way that the killer could have planned for the crime scene to be discovered specifically during a blue moon and therefore no reason to think the lunar event has any relevance to the murders. The sheriff's department spokesman may have mistakenly believed that the killings had happened during the blue moon. No further information has surfaced connecting the crime to witches or Satanism.

Mysterious Indian Stone Etching Mystery Solved

Benjamin Radford

HINDUSTAN TIMES

Rumors of a supernatural phenomenon circulated among residents of two Indian states, Madhya Pradesh and Uttar Pradesh, in July 2015. Residents were baffled by white or light gray marks that had been inexplicably appearing on mortar and pestle and grinding stones, common in Indian homes. Many feared that "mysterious forces" had entered the homes at night and left the marks.

Scientists finally found a more down-to-earth explanation—in fact one closely tied to the earth: beetle dung. According to an entomologist interviewed by the *Hindustan Times*:

> The caustic excretion of beetle species is most likely causing whitish abrasive marks on the stone surfaces which looks like scratch marks.... Many beetle species of these sub families, which also occur in Madhya Pradesh, excrete a caustic substance which could be acidic in nature, causing whitish abrasive marks on the stone surfaces which is being mistaken as miracle marks on mortar and pestle and grinding stones. (http://tinyurl.com/ogvs9sy)

That the oft-overlooked and lowly beetle might have unusual characteristics is not surprising. In some cultures, beetles themselves were worshiped; ancient Egyptians revered the dung or scarab beetle, which was associated with the creator god Atum. Bombadier beetles, which are related to the prime suspects in the Indian mystery marks, have an interesting chemical defense: when two chemicals stored separately in the beetle's body (hydrogen peroxide and hydroquinone) are combined, the result is a scalding hot (about 200 degrees F) toxic liquid that blinds predators. Beetles are not the only animals that excrete acid; for example, clams excrete a neurotoxic acid that, while not likely to leave marks on stone, can be dangerous.

Scientists finally found a more down-to-earth explanation: beetle dung.

The predator beetles are found in the region and their excreta does leave marks that look remarkably like stone grooves or etchings. The beetles, like many insects, would come out at night to search for food while people sleep. They would be attracted to the grinding stones (often located on the ground) and therefore likely be found around the stones where food and spices are ground.

Why were the odd marks interpreted as possibly supernatural? One reason is that Indian culture tends to be accepting of paranormal explanations for unusual phenomenon, ranging from conjoined twins interpreted as a reincarnated Hindu god Ganesh to claims of spontaneous human combustion. This mystery has been solved, and the theory of a magical origin for the whitish marks has been debunked; the good news is that the marks on the stones used in food preparation were not caused by unknown supernatural spirits entering Indian homes at night; the bad news is that they are from beetle poop.

[FROM THE EDITOR *continued from p.4*

dependents, and 82 percent of Democrats).

The poll also showed most Americans agreeing that the presidential candidates should participate in a debate to discuss key science-based challenges facing the country such as healthcare, climate change, energy, education, and the economy (91 percent of Democrats, 88 percent of Republicans, and 78 percent of Independents).

We science-minded people like such polls because they affirm a recognition of the value and importance of science that always seems missing in political discussions. This poll is no exception. Politicians *should* better understand science. So should their constituents. Yet there is always a difference between what people say and what they do. Few people are going to say that science is not important or that their favorite political candidates should not know something about it or discuss it in national debates.

Despite that, we have an appalling amount of scientific ignorance and even openly anti-science attitudes (on specific hot-button topics) among many members of Congress today, and they were all elected to office by their

Ten Distinguished Scientists and Scholars Named Fellows of Committee for Skeptical Inquiry

We reported the election of ten new fellows of the Committee for Skeptical Inquiry, chosen for "distinguished contributions to science and skepticism," in our November/December 2015 issue (pp. 6–7). We published capsule bios of each but were unable to include their photos. Here now are photos of the new fellows:

John Cook

Krista Federspiel

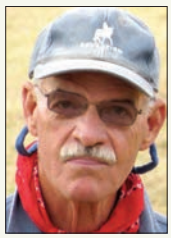
Julia Galef

Stephan Lewandowsky

Daniel Loxton

Paul Offit

Naomi Oreskes


James L. Powell

Donald R. Prothero

Stuart Vyse

The Committee's newly elected Scientific and Technical Consultants are:

Susan Gerbic

Gabor Hrasko

John R. Mashey

Julia Offe

constituent publics. Likewise, several Republican presidential candidates who have expressed anti-science positions are high in the polls. So it seems that a large segment of the public—while saying all good things about science and its importance—nevertheless tolerate their political representatives' lack of scientific knowledge or even opposition or disdain about it.

This poll didn't identify specific key sticking points of partisan conflict on science-related issues, so it is good in the mom-and-apple-pie generalities but not necessarily in showing true attitudes when specific policy-related controversies arise. It is always good to know that the public at least gives lip service in support for more science-informed politicians and political debates. Yet actions would be more meaningful. As for those debates, it may be easier to encourage debate hosts and media questioners to get *some* scientific content into a debate than to insist that an *entire* debate deal with science-related issues. That's the science-informed pragmatist in me talking.

Kendrick Frazier

The Sixteenth European Skeptics Congress, London, 2015

MICHAEL HEAP and CHRIS FRENCH

The Sixteenth European Skeptics Congress was held at Goldsmiths College, London, from September 11–13 (http://euroscepticscon.org/). This biannual event was last held in London in 2003. On this occasion it was cohosted by the U.K.'s Association for Skeptical Enquiry and the Anomalistic Psychology Research Unit of Goldsmiths College. By way of preparation for the congress, Michael Marshall of the Good Thinking Society did podcast interviews of congress speakers (http://goodthinkingsociety.org/category/projects/2015-esc-podcast/).

On the day before the congress there was a satellite meeting titled "Codes, Coincidences & Chocolates Fountains: How Numbers Shape our Lives" featuring contributions from Simon Singh, Chris French, Rob Eastaway, and Helen Wilson. This was billed as "a fun maths event." Topics were as diverse as hidden mathematical references in the *Simpsons* cartoon series, coincidences and the paranormal, examples of counter-intuition in mathematics, and the fluid dynamics of chocolate.

In the evening, Greenwich Skeptics in the Pub arranged a series of brief talks at the Students Union from several speakers on the growth of skepticism in the United Kingdom. This was part of a tribute to Michael Hutchinson, one of the great pioneers of modern skepticism in Britain, who received a gift from the speakers consisting of a framed caricature of himself and James Randi demonstrating the art of spoon-bending, with the most famous spoon-bender of them all lurking in the background. A video tribute to Michael from the great man himself (i.e., Randi) delighted the audience.

Congress delegates with Chris French (center) and Chris Peters (left) of the "Ask for Evidence" campaign

A video tribute to Michael Hutchinson from the great man himself (i.e., Randi) delighted the audience.

The next morning, following welcoming speeches and another video greeting from Randi, the congress program began with a contribution from Mark Newbrook on skepticism in linguistics, an important subject that is not well-covered in skeptical literature. Mark has rectified this in his book *Strange Linguistics* (2013), which documents the wide-ranging facets of fringe linguistics. This talk was followed by Klaus Schmeh from Germany on "Parascientific Codes," a humorous and informative review of "hidden messages" that people have divined in various sources, the Bible being the most well-known to skeptics. Klaus has put a recording of his talk on YouTube (https://youtube/jS56Pe_nfsE).

After coffee, the ever-popular Richard Wiseman presented his audience

with some tips for using YouTube to spread information about skepticism. As always, Richard's talk provoked much mirth among members of the audience, especially examples from his YouTube series "Quirkology" (https://www.youtube.com/user/Quirkology).

A keynote address from Professor Jim Al-Khalili of Surrey University on quantum biology followed. Jim is well-known in the United Kingdom as a presenter of TV documentaries on modern physics and author of popular books on the subject. His latest interest is researching quantum effects in living organisms, and he has written a well-received book on the subject called *Life on the Edge* (2014). Among possible examples of quantum effects in biology, Jim discussed genetic mutations, navigation in the European robin, and photosynthesis.

After lunch, we had the first of two panel debates. The topic was "Skepticism, Humanism and Religion." The panelists were Andrew Copson of the British Humanist Association; Professor Adam Dinham, director of the Faiths and Civil Society Unit at Goldsmiths College; Rabbi Pete Tobias, a well-known speaker and writer on liberal Judaism; and James May, a general practitioner and a committed Christian. (It was unfortunate that Maryam Namazie of the Council of Ex-Muslims of Britain was unable to attend because she was delayed on her return from abroad.) Chaired by barrister Geoff Whelan, the central question addressed by the panel was whether it is possible to be a skeptic in the modern sense and yet also be religiously committed. There was much heated discussion by the panel, and it is fair to say that no consensus emerged: James, Pete, and Adam insisted that skepticism and religion are compatible, whereas Andrew and seemingly most of the audience took the opposite view.

The last presentation of the day was Amardeo Sarma of the German Skeptics (GWUP). This was an up-to-date review of the evidence for man-made climate change. Amardeo enumerated the reasons occasionally scientists—but more often journalists, economists, and politicians—react with such hostility to the idea that human activity is contributing to global warming.

Greenwich Skeptics in the Pub held an additional event that evening, a presentation by Gustav Kuhn of Goldsmiths College titled "The Science of Magic." This proved to be a very popular event, with Gustav first treating the audience to a baffling demonstration of his skills as a magician and, following a break to enable people to replenish their glasses, a PowerPoint presentation and more demonstrations on understanding the psychology and science behind the magician's art.

Leoš Kyša, Antonin Pavlicek, Martin Mahner, Caroline Watt, and Chris French discuss "Investigating Paranormal Claims."

It was very appropriate that the congress was held during the thirtieth year since the inception of the unit.

The session Saturday morning was devoted to research and public engagement activities that have been conducted at Goldsmiths College's Anomalistic Psychology Research Unit and led by Professor Chris French, who established the unit fifteen years ago. Speakers were journalist Rosie Waterhouse on her work on satanic panics; artist Alasdair Hopwood, who has produced artworks on the theme of false memories; Christopher Thresher-Andrews on the psychology of belief in conspiracies; Barbara Rowlands, who talked about media coverage of alternative medicine; Rob Teszka, again on the psychology of magic; and filmmaker Carla MacKinnon and psychologist Dan Denis, who have been researching sleep paralysis.

The theme of investigating unusual and paranormal or parapsychological phenomena was resumed in the afternoon, beginning with a talk by Caroline Watt of the Koestler Parapsychology Unit of the University of Edinburgh. It was very appropriate that the congress was held during the thirtieth year since the inception of the unit, and Caroline presented us with an overview of the work conducted there on such topics as parapsychology, the psychology of belief in the paranormal, and the psychology of anomalous experiences. Two presentations on testing individuals claiming to have paranormal abilities

followed. Needless to say, none of the tests was successful. As is often the case, although they provoked much laughter from the audience, they revealed some interesting aspects of human nature. Most were claims of dowsing ability but with some curious twists. The speakers were Antonín Pavlíček and Leoš Kyša of the Czech Skeptics and Martin Mahner of the German Skeptics. Martin defended the reasons for taking the time and trouble to test these kinds of claims. There followed a panel and audience discussion by the speakers and Chris French on testing paranormal claims.

The conference organizers decided to leave Saturday evening free for delegates to explore the nightlife of the locality, which includes the very beautiful and historic Royal Borough of Greenwich.

Sunday morning began with a paper by Deborah Hyde, editor of *The Skeptic* (UK), on fairies, taking a historical perspective and demonstrating what they teach us about people. Seemingly, these creatures were not as kindly and pure as we nowadays take them to be. This was followed by a critique of "integrated medicine" by the highly respected Edzard Ernst, former professor of complementary medicine at the University of Exeter. Edzard has recently published an account of his life, including his time at Exeter, titled *A Scientist in Wonderland* (2015), which Chris French reviewed in the May/June 2015 Skeptical Inquirer. This led to a panel and audience discussion on skepticism in medicine, where Edzard was joined by Susan Bewley, professor of complex obstetrics at Kings College London; James May, whom delegates met on Friday; Catherine De Jong, an anesthetist, addiction specialist, and president of the Dutch Society Against Quackery; and Maciej Zatonski, a surgeon now living in the United Kingdom and a founder of the Polish Skeptic Club. There was much discussion about why people opt for alternative medicine, but James and Susan talked in particular about reasons we should be skeptical about a number of aspects of mainstream medicine—for example the tendency to "medicalize" everyday problems in life and to create an overabundance of medical diagnoses, as well as the more egregious practices of the pharmaceutical industry.

Martin Mahner speaking on "Investigating Unusual Claims in Germany."

It was especially satisfying that colleagues from mainland Europe were very well represented.

The congress program concluded with a presentation by Chris Peters of U.K.'s Sense About Science. In his presentation Chris covered the "Ask for Evidence" campaign, whereby members of the public, including (gratifyingly) journalists, may consult experts in various fields about whether evidence actually exists for numerous claims, often quite sensational, that appear in the media. Sense About Science has also been active in promoting an understanding of the scientific approach among British politicians, of which only a tiny minority have any background in science.

By the usual standards this was a small congress, but it was a very lively event, and feedback from delegates has been uniformly enthusiastic. It was especially satisfying that colleagues from mainland Europe were very well represented. So what better way was there to round off the congress than to repair to the garden of that excellent local pub, The Rose, and enjoy lunch and beer in the sun with so many of our European friends, old and new, and where our Czech and Polish colleagues had already been spotted the previous day busily drafting plans for the Seventeenth European Skeptics Congress in Poland in 2017. ■

Michael Heap is a clinical and forensic psychologist and Chairman/Secretary of the Association for Skeptical Enquiry.

Chris French is head of the Anomalistic Psychology Research Unit, Goldsmiths College, London, and a Committee for Skeptical Inquiry fellow.

The SkeptiCal Conference

SUSAN GERBIC

I love attending skeptic conferences. For much of my life I wasn't aware that like-minded skeptical people even existed, let alone held conferences. When I discovered that others were interested in investigating and exposing pseudoscience, I was thrilled. And not just at being able to attend lectures but at being able to socialize and have great discussions about the topics with people who feel that evidence matters. Because of these experiences, my curiosity has expanded; I've learned about facilitated communication, grief vampires (aka psychic detectives), and really cool science things like missions to Mars, the Hubble telescope, the Hadron Collider, and more.

Because scientific skepticism is a way of thinking, a method we use to expand our epistemology, we have a broad range of topic choices. And this year's SkeptiCal conference was no exception. The fifth annual West Coast conference was held in Oakland, California, on Saturday, June 6. I've attended all five conferences and lectured on the Guerrilla Skepticism on Wikipedia (GSoW) project at the second one. There are special memories for me at each.

This one-day event is hosted by the Bay Area Skeptics led by CSI Fellow Eugenie Scott and the Sacramento Area Skeptics led by Frank Mosher. It has floated between Oakland and Berkeley and is generally held in mid-May or early June. Traditionally there is a Skeptics in the Pub event the night before somewhere nearby, where early arrivals can renew old friendships and make new ones. This year it was easy to find the social meet-up because Bay Area Skeptic board member Sheldon Helms brought a brain to the event. I'm talking about a real human brain floating around in liquid—I'm sure that set us apart from the average person just hanging out around the pub area.

Peggy Lemaux giving her talk "The Debate over Genetically Modified Foods."

The format of the conference has not changed in the past few years: free exhibitor tables scattered around the walls of the main lecture room, lectures for the entire audience, and then mid-morning and mid-afternoon workshops running simultaneously held in an adjoining room. One of my favorite parts of attending skeptic conferences is the lack of cliques and a complete friendliness toward strangers. People start walking in a direction, see others with nametags walking that same way, and suddenly a party of four turns into a party of five, six, or more. Random attendees just hanging out and bonding over common themes is an important part of our world. It's how we grow our community, and I believe it is the first step toward activism.

I attended all the lectures I could,

and those I didn't get to my fellow attendees from my local Monterey County Skeptics filled me in on. The conference opened with biologist Peggy Lemaux explaining GMOs and the struggles with funding for researchers and how best to educate the public, legislators, and the media. Quite a timely topic. Lemaux was asked about labeling-food laws and her answer was different from what I would have expected.

Kenzi Amodei during her workshop, "Your Inner Simulator: How to Integrate Logic and Intuition."

She first felt that it will be very difficult to come up with a good definition of "genetically modified" foods; how far back do we go? Early carrots, wheat, and bananas are nothing like what we eat today. Also she was concerned that the public will not pay attention to labels and offered the example of California's Proposition 65 law, which requires stores to post warnings when a product has chemicals that might cause birth defects, cancer, or other harm. The warnings are so ambiguous that consumers rarely read or understand the signs. Lemaux believes that GMO-labeling laws could make the consumer feel like they are getting good information but in essence the law would be over simplifying a more complicated matter. This leads to jaded consumers blindly believing that something must be wrong with GMOs but not understanding what a GMO actually is.

Next we had our first difficult decision, as it was breakout time and attendees were forced to choose a lecture. Thankfully all the lectures were recorded, and video will soon be available. During the morning breakout, Ron Hipschman's and Kenzi Amodei's sessions split up the audience into roughly 50/50 attendance. I ran around photographing sessions the whole day so didn't really get to listen to any of the breakouts in full. I did end up staying in Hipschman's room once I saw he was showing clips of old *Star Trek* episodes and scenes from Kubrick's *2001: A Space Odyssey* movie. Hipschman's lecture was called "Science (in) Fiction" and he showed us many examples of technology from older science fiction movies and how in 2015 we now use similar technology. Tricorders and communicators from *Star Trek* are now just cellphones and computer tablets. Modern hospital rooms look eerily like *Star Trek*'s sickbay. *The Hitchiker's Guide to the Galaxy* book from the Douglas Adams series of the same name is very nearly what Wikipedia is now. If that comment from Hipschman hadn't won me over, then his next statement (saying that he dislikes any storyline with a plot that involves time travel) did. I've never heard anyone else share my opinion. It always just feels like the writer is cheating whenever they use time travel; it's right up there with "it was all a dream" for me.

On the car ride home, my fellow attendee Deborah Warcken enthusiastically endorsed Amodei's lecture titled "Your Inner Simulator: How to Integrate Logic and Intuition." Sadly, I also missed Natalie Batalha's lecture, "Toward Other Earths, Other Life: NASA's Kepler Mission." During lunchtime, many of the people at our table excitedly discussed points Batalha made. I suppose I will just have to wait for the videos to be released.

Following lunch, Ann Reid, the current executive director of the National Center for Science Education, gave a talk titled "OMG Virus!! Flu, Ebola, Measles, and When You Really Should Be Afraid." One of the best lines of the afternoon was when Reid was asked a question about why the 1918 flu epidemic was so virulent and how it transferred from birds to humans. Her answer, "We just do not know," is one we don't see often from believers in the paranormal. She spent a chunk of her time explaining what a virus actually is and why it is important for people to understand that "viruses do not have goals"; they are not sentient. I learned that viruses have gotten a "bad rap" and we still have a lot to learn about them. When asked during the Q&A about what the public should be afraid of, she responded that airborne illnesses like whooping cough and measles are far more worrisome than Ebola.

The afternoon breakouts were again about 50/50 split in attendance, and I managed to spend time in each. In the main room was Isil Arican, who discussed skeptical activism with a focus on her native country, Turkey. She showed a video of her taking a homeopathy challenge from a practitioner. He challenged her to take one tablet of Arsenicum 30C every hour and said that after the third hour she would be seeing symptoms and would need to stop. She started at 9 AM and filmed herself taking the pill every hour and then posted that video to YouTube. She did this for ten hours and the Arsenicum had no effect on her. What ended up happening was that people were fascinated by what would happen and kept checking

in to see what the result would be; she ended up gaining a thousand new YouTube followers. The Yalansavar.org website receives over 1.2 million views a year. Arican explained that currently in Turkey it is very unpopular to attack religion directly because it turns people off without them staying to hear your message. They have had better success gaining attention by challenging non-scientific medical claims.

Frank Mosher held a workshop focusing on how to "Produce Skeptical Children," which was very hands-on with science experiments. In 2014, Mosher gave this same workshop but focused on using magnets and had the attendees making silly putty. This year, Mosher used dry ice to produce a lot of really cool oddities. He got my attention when he started lighting things on fire and showing us experiments on putting fires out. Throughout his workshop Mosher gave examples of what a teacher might say about each experiment depending on the grade level of the students.

The last lecture of the day was from John Ioannidis from Stanford University and titled "Reproducible Research: True or False?" He discussed research methods, biases, conflicts, and wastefulness when it comes to actually doing scientific work. Someone asked him a question about how prevalent fraud is in the scientific world. His answer was that he did not think that a scientist would go to all the trouble to obtain a science degree and then knowingly try to deceive people. In his opinion if it happens, the intent was not there when they went into the field.

If conferences have a theme, I would have to say that the SkeptiCal conference is very focused on science and research. Many of the speakers actively work in the hard sciences, are local to the Bay Area, and are less likely to be authors doing a book tour. It's unlikely you will find these speakers at the average skeptic conference, which makes it all the more enjoyable to hear something fresh and new. SkeptiCal also has a more professional feel to it with short introductions, allowing the speaker to get right to the lecture. This keeps everything moving and on time, a little detail that is often forgotten but very much appreciated. I also appreciated the artwork and look of the graphics that are used throughout the event and on the T-shirts, which I'm told were designed by Kernan Coleman and Ranch 7 Creative.

If conferences have a theme, I would have to say that the SkeptiCal conference is very focused on science and research.

I talked with the organizers and learned that they usually hit about 200 in attendance, but in 2013 about 250 attended. Over a third of the room when asked were attending their first skeptic conference, and the diversity of the audience was obvious. The one question that is asked on the survey every year is should SkeptiCal be a two-day or stay a one-day conference. I'm told that every year they get the same results with about half saying keep it a one-day conference and half say make it a two-day conference. With numbers like that, it makes it difficult for organizers to know if they can grow this conference or not. Past conferences have been held at the Berkeley Marina, Double Tree, but the current location at the Asian Cultural Center located in Downtown Oakland has allowed attendees more options for lunch within walking distance and it is very close to mass transit. The organizers want to keep admission prices low to make the conference accessible to more people. Prices range from $25 (student purchased in advance) to $55 (purchased close to date and includes T-shirt).

This year all the exhibitor tables were given a lot of attention. The conference's goal is not only to educate through the lectures and workshops but also to help form community and activism by showcasing the local skeptic groups and projects. Yes, the GSoW project had its own table and I was able to explain how important Wikipedia is when trying to educate the world about critical thinking. Everyone I talked to was in complete support of our mission. One representative from each table was brought to the stage and was given thirty seconds to plug their table. They encouraged us to be creative but to practice because thirty seconds is really fast and they would be strictly enforcing the time. When it was my turn I launched into song about GSoW; I sang it off-key and without a tune, and the lyrics didn't rhyme. It was horrible, and is available for review on Lanyrd and YouTube. I believe so fully in the GSoW project that I have no problem making an idiot of myself as long as the goal is to bring more attention to what we are trying to do: change the world one Wikipedia page at a time.

On the car ride home, Jan and Deborah agreed that they had a wonderful time and left feeling inspired. My summation of the conference is that it was very instructive and very current. It lacked the pizazz of an emcee like George Hrab, who is known for introducing speakers with a personal song, limerick, or interpretative dance. But it is a different kind of event; it is very sciencey and very well-run. All the attendees I spoke to had a great time and learned many new things. I saw lots of smiles among the audience members, and not just during comedy magician Robert Strong's closing of the conference. This event shows me we are all a bunch of science nerds. I know I'm in the right world, and that is really a wonderful thing. ■

Susan Gerbic is the cofounder of the Monterey County Skeptics and leader of the Guerrilla Skepticism on Wikipedia project. You can learn more at SusanGerbic.com.

Skepticism in Popular Music: The Art of Discourse

RUSS DOBLER

Nearly 500 people crowd The Fashion Institute of Technology's Haft Auditorium when George Hrab takes the stage for his hybrid musical act/quiz show, *A Skeptical Extravaganza of Special Significance*. The bald, bespectacled performer is joined by the self-described Rogues of the immensely popular *Skeptics' Guide to the Universe* podcast and children's show host turned science advocate Bill Nye ("The Science Guy").

Hrab leads the group as they tackle such hard-hitting topics as the *Millennium Falcon* vs. the starship *Enterprise*, but really turns up the heat when he forces *Skeptics' Guide* point man Steven Novella to defend the American system of units against Nye and the metric system. Nye, perhaps emboldened by his audience-decided victory, later interrupts Hrab as he plays an acoustic version of Thomas Dolby's 1980s synth-pop song "She Blinded Me with Science." Hrab responds by offering his guitar to Nye, who politely declines.

The *Extravaganza* is one of the festivities associated with the 2015 Northeast Conference on Science and Skepticism (NECSS), jointly presented by the New York City Skeptics and the New England Skeptical Society. On this day, Hrab's show of songs, mock debates, and rounds of Pictionary about Area 51 and water fluoridation actually outdraws the earlier seminar talks on science-based medicine. Hrab's name carries cachet in the skeptical community because he has emceed the last three of the James Randi Educational Foundation's The Amaz!ng Meetings (TAM) as well as the Australian Skeptics National Convention in Sydney last November, but being in this position was never really a goal for him.

"I never sat down and said, 'All right, here's the master plan,'" Hrab says. "I was just somehow found."

George Hrab leads "A Skeptical Extravaganza…"

Hrab's day job is playing drums for the Philadelphia Funk Authority, a role he's filled for almost twenty years. About a third of the songs from his solo recordings—on albums such as *Trebuchet* and *Minutiae*—are of a skeptical subject matter, Hrab says, although that's not exactly intentional.

"To me, I'd rather write a song whose principles can apply more generally, but if you're a skeptic, you *really* get it," Hrab says, citing "Everything Alive Will Die Someday" as an example, with the lyrics:

To look into your eyes is worth,
the eventual demise of Earth.
Those who talk of an extra inning,
imply this is only a beginning,
but there's no prize you will be
winning,
your existence is enough to keep you
grinning.

While Hrab is bored with the "six trillion love songs" that already exist, preferring to write about other things—such as extinct species of fish—he says trying to force inspiration on any particular topic is the wrong way to go.

"Whenever the muse wants to slap you in the face, you just take it," Hrab says. "And if it's going to be about skepticism, fine."

Dick Murray "Baba" Brinkman didn't really know what skepticism was when biologist Mark Pallen commissioned him to write a rap show about evolution for a celebration of Charles Darwin in 2009. Pallen approached the then-twenty-nine-year-old British Columbia native after a performance of *The Rap Canterbury Tales*, which adapted material from Brinkman's medieval literature master's degree thesis.

"If you can rap *The Canterbury Tales*, I bet you can rap *The Origin of Species*," Brinkman recalls Pallen saying. "Probably; sign me up," Brinkman replied.

Brinkman read nothing but popular books on biology, such as Richard Dawkins's *The Selfish Gene* and Jerry Coyne's *Why Evolution Is True*, during the short six months he had to prepare *The Rap Guide to Evolution*. But it wasn't enough.

"At that point, I had barely scratched the surface," Brinkman says. So he continued his research for another year and a half while performing the show around the world, including a five-month stint Off-Broadway at New York City's SoHo Playhouse.

It's here that Brinkman's latest show, *The Rap Guide to Religion*—which will go on to be extended for a seven-month

run—plays in front of an audience of about fifty people on a Friday night. A *New York Times* description of the performance as "the best TED talk ever, but with musical breaks" is apt, as Brinkman's brief raps are more like interludes between humorous spoken word analysis and graphs of data projected on a screen behind him.

"It used to be closer to half and half," Brinkman says of the balance between rap and talk. "But I just keep improvising new things to say about the subjects."

Though jocular—at times he compares Richard Dawkins to hip hop superstar Rick Ross and tells Fergie to thank evolution for her "lady lumps"—Brinkman is never dismissive of religious beliefs. Vocally objecting to accusations that faith is born from ignorance or fear, he instead chooses to question why religion is important to us, citing group selection and the innate human ability to detect agency wherever one looks.

Brinkman crystallizes his naturalistic view on the origin of religion, and the specific religions we have today, when he raps:

Evolved by a culture through religious competition,
'cause our minds are designed to get religious,
in the right conditions.

Religion evolves.

Despite such predetermination, Brinkman believes religious rituals can be replaced with more secular activities. That's why he asks attendees of his shows to throw their hands up and sing along with the choruses—to help create those social bonds in a more secular way.

"You don't need to be in a church to experience that; the churches are just particularly good at it," Brinkman says. "But so are theaters and so are rap concerts."

Nick Jakubowski of the band BILLxNYE (no relation to that other Bill Nye) takes a more interpersonal approach. Prior to opening for other groups with the names Death Dealer and Demon Eye, he sits on the stage of Brooklyn's Acheron and chats with a few of the twenty-five fans in attendance, his shoulder-length hair bobbing as he excitedly speaks.

A major conversation-starter is displayed on BILLxNYE's merchandise table, located somewhere beyond the black velvet painting of Vladimir Putin at the first bar but before the second bar in the corner of the concert room. Most people at the band's shows like the beginning of the T-shirt's slogan, "Noise. Not Music," but some balk at the rest, "Facts. Not Faith." Jakubowski says that's fine with him as long as it gets people with differing viewpoints talking to each other.

One of those shirts will set you back six dollars, which is only fifty cents more than the cost of production. And if you can't come up with the scratch, Jakubowski will probably just give you one. Like any good punk rocker, money doesn't matter much to him.

"The message is more important," he says.

That message might be hard to receive, though, given Jakubowski's choice of medium. He and his two (sometimes three, sometimes four) bandmates play grindcore, an extreme version of heavily improvisational punk music that's characterized by atonal dissonance and a lack of melody. Tonight BILLxNYE is joined by a member of the band Spreaders, who is using audiotape to create feedback loops and noise.

"The noise element is very important to me," Jakubowski says. He believes the incomprehensibility of his vocals is actually beneficial, as it forces interested listeners to read the lyrics.

"When they look it up, that's skepticism—you *should* be doing that," he says. "Don't take my word for it."

One of the few decipherable phrases Jakubowski utters from the stage is a plea for just that kind of diligence, as he introduces a group of songs about Richard Lenski, famous for documenting the adaptations of *E. coli* bacteria in laboratory specimens.

"So the next time someone tells you they haven't seen evolution happen, tell 'em to read a fucking book," he says.

The songs call the bluffs of doubters with the lyrics:

(Over) 70,000 generations of Lenski's
E.coli *bacterium,*
are safely preserved as living fossils.
(Anyone may request samples of these strains for outside study),
he's just awaiting your credentials.

Jakubowski, twenty-three, has always liked heavy music but didn't completely become a skeptic until early in college, when he watched a debate between atheist Sam Harris and Christian apologist William Lane Craig.

"I saw one side using logic and reason and one side kind of backpedalling and sidestepping," Jakubowski says. "It was very dishonest."

Shortly after that, Jakubowski began to see similarities between science's honesty and the raw emotion of punk music. Now he thinks that punk could use some of science's discipline.

"They'd be like, 'Fuck you! Because I said so!'" Jakubowski says, referring to the pioneers of punk's past. He likes that scientists can take it a step further.

"They'd be like, 'Fuck you—but here's all the data why you're wrong,'" Jakubowski says. "It snapped in my head one day that science is the most punk rock thing you can do." ■

Russ Dobler is a geophysicist, journalist, and member of the New York City Skeptics. He writes about the intersection of science, skepticism, and pop culture for the websites Adventures in Poor Taste! and the pulp press. You can follow him on Twitter @russdobler46 for more on those topics or to find out what beer he's been drinking lately.

Illusions of Memory

These are remarks by psychologist and CSI Fellow Elizabeth Loftus accepting an honorary doctorate at Goldsmiths College, University of London.

ELIZABETH LOFTUS

The honorary doctorate being awarded by Goldsmiths is deeply meaningful at this particular time in my life.

It gives me a chance to talk with you about my work on illusions of memory—or the memories that people sometimes have of seeing things or doing things that they never saw or did.

I'm proud of the work I've been able to accomplish as a psychological scientist and proud of the people I've had a chance to help along the way.

When I began my life work on illusions of memory, I had no idea it would one day prove to be such a socially relevant and politically explosive topic. Of course, couples and siblings quarrel endlessly about whose memory of past events is right—that is the amusing and infuriating *Rashomon* aspect of every family's life. But who could foresee, in the late twentieth century, "recovered memory therapy" or that people would come to believe with all their hearts that they remembered being abducted by aliens or Satanic cults? Who knew that by the first decade of the twenty-first century we would find hundreds of individuals in prison who were innocent—proven innocent by DNA analysis—and the major cause for their wrongful convictions was faulty human memory?

And so, as my research on memory evolved, its findings became ever more applicable in the service of justice.

To briefly summarize, in that research I and my collaborators showed that you could alter people's memories for crimes, accidents, and other events that they had recently witnessed. You could pretty easily make someone believe that a car was going faster than it really was or that the bad guy had curly hair instead of straight hair. Later we would show that you could plant entire events into the minds of ordinary healthy people, letting them believe that they had experiences that they never ever had—even experiences that would have been pretty traumatic had they actually happened.

So you can see how these findings might be applicable in the service of justice. They help us understand how improper handling of eyewitness testimony can lead to false memories and the conviction of innocent people. They help us understand how sug-

gestive or coercive therapy can lead people to develop memories of being abused in a Satanic cult, accusations that can cause untold misery for innocent people and their families.

At the same time, this research became emotionally controversial and the focus of terrible hostility among those who could not accept its findings or its implications for the real world.

In my case, disgruntled people have written countless threatening letters. They have tried generating letter-writing campaigns to the chair of my former academic department, the president of the university, and even the governor of the state to get me fired from my academic job. They have threatened violence at places where I've been asked to speak, prompting universities on several occasions to provide armed and unarmed guards to accompany me during those speeches. People spread defamatory insults in their own writings, in newspaper columns, and, of course, on the Internet. One person even sued me in court when I published an article questioning the veracity of a psychiatrist's case study of a young woman's recovered memories of maternal sexual abuse. That litigation dragged on for almost five years before it ended.

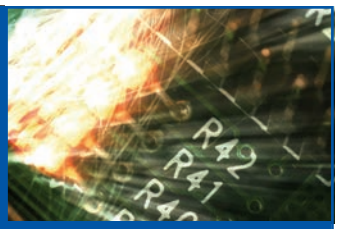
Through these experiences, I've learned firsthand that science is never dispassionate, at least not if you are studying anything that has political, emotional, or financial implications for people's lives: child testimony, sex, the unreliability of projective tests such as the Rorschach, or, in my case, illusions of memory. I could have chosen to study memory in the sea slug—hardly anyone would get exercised about that. But I chose to study human memory, eyewitness testimony, false memories, confabulation in adults and children, and harmful therapeutic methods. And big trouble came my way.

But I'm proud of the work I've been able to accomplish as a psychological scientist and proud of the people I've had a chance to help along the way. I've learned to accept the hassles as the price that all scientists pay for doing research that matters or that threatens deeply held beliefs.

And this brings me back to Goldsmiths—where we are today: I am especially grateful for the honorary doctorate from Goldsmiths—where a number of superb academics are doing research that threatens deeply held beliefs, and also matters to people. That is why this honor holds such extra-special, extra-poignant, meaning for me.

Elizabeth Loftus is Distinguished Professor, Psychology & Social Behavior and Criminology, Law & Society, in the Department of Cognitive Sciences and School of Law, University of California, Irvine. She is a member of the National Academy of Sciences and a fellow and member of the Executive Council of the Committee for Skeptical Inquiry.

SCIENCE AND THE PUBLIC



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Joe Nickell, PhD, a former private detective, did graduate work (both coursework and independent studies) in folklore. Among his many investigative books is *The Science of Ghosts*.

The Brown Mountain Lights: Solved! (Again!)

So-called "ghost lights" are reported at various sites worldwide, the term being applied to luminous phenomena that, many claim, defy explanation. However, Rosemary Ellen Guiley in her *The Encyclopedia of Ghosts and Spirits* (2000, 156), cautions: "Many reports of ghost lights can be explained naturally, such as car headlights or phosphorescences known as *ignis fatuus*" (literally "foolish fire," e.g., combustion of marsh gas).[1]

Among the most famous ghost lights are the Marfa Lights, after a town in Texas, reported first by a settler in 1883 (Lindee 1992; Guiley 2000, 156); the Hornet or Ozark Spooklight, south of Joplin, Missouri; and the Brown Mountain Lights, near Morganton, North Carolina, reported since 1913 (Guiley 2000, 156–157; Corliss 1995, 71–72).

There are also ghost lights at sea—for example the Bay Chaleur Fireship, seen off the coast of New Brunswick, Canada, and attributed to the phenomenon of St. Elmo's fire (Corliss 1995, 72–73).[2] In 1999 at Mahone Bay, Nova Scotia, I investigated the Teazer Light, another reputed phantom ship in flames. Although the rare light did not appear to me during a vigil, my research turned up an instance when the phenomenon proved to have been the moon, just coming over the horizon and being viewed through a bank of fog (Nickell 2001, 188–189).

Here is my report on the Brown Mountain mystery, based on lengthy research and two visits my wife, Diana, and I made to Brown Mountain in 2014 (the first, however, becoming a fiasco when the area was shrouded in fog!). (See figure 1.)

Evolution of the Lights

In investigating the Brown Mountain Lights, I discovered that the phenomena—plural—have evolved over time, along with explanations for it. I consider that there are three main historic periods or phases:

1. Before 1913: Myths and Superstitions. A number of legends are associated with Brown Mountain. A sign at the Brown Mountain overlook (on highway 181, at mile marker 20, north of Morganton) claims that "For hundreds of years, people have seen mysterious lights floating above Brown Mountain." Although no historical record is cited or, indeed, appears to exist, the text nevertheless asserts: "According to Cherokee legend, in 1200 the Cherokee fought a great battle near Brown Mountain against the Catawba Indians and many warriors died. The lights are said to be the spirits of Cherokee maidens who search in vain for their loved ones." The sign's text continues:

> A more recent legend says the lights are caused by the spirit of a heartbroken woman searching the mountain at night by torch light looking for her fiancé who failed to come for her on their wedding day. Another legend tells the story of a young mother-to-be, murdered by her wicked husband. The lights materialized to help neighbors find the young woman's body, and still appear today reminding evildoers that their crimes will be revealed.

This latter tale is elaborated into an entire chapter in *Dixie Spirits* (Coleman 2011, 173–179), a book with many laughable errors and a complete absence of references. (However, see Walser 1980, 44–45, for earlier sources.) Somehow the author—ghost ballyhooer Christopher K. Coleman—has discovered a wealth of detail about "Belinda" and "Jim" (as he calls the supposed ghosts). Not only are no sources cited, but elsewhere in his book (2011, 280) he actually disparages such "scholarly trappings"—just what could help us decide whether he was relating folklore or mostly writing fakelore.

Still another legend of the Brown Mountain Lights was told to me by a young man visiting the overlook. Supposedly, an old slave had become lost and wandered with a lantern, trying to find his way back to his master's home but failing, a pursuit that he now perpetually continues as a ghost. This is a *variant* (as folklorists say) of a legend related by Joshua P. Warren (2014, 8):

> Brown Mountain was named after a plantation owner who lived in the area in the 1800s. He was kind to his slaves. One night he ventured onto the mountain to hunt. When he did not return, one of his slaves took a lantern and scoured the ridge for him. He, too, was never seen again. Today you can still see the "faithful old slave's" lantern burning as his spirit still searches for his lost master.

As I note, however, this tale is, in turn, quite similar to a narrative from West Virginia about the Cole Mountain Light (near Moorefield), attributed to the mid-1800s. An important difference is that the hunter at Cole Mountain was not a man named Brown but a landowner named Charles Jones (Musick 1977, 65–67, 184). It is evident that the legend of the slave searching with a lantern is what folklorists term a *migratory* legend—one known in widely different locales but able to become attached to particular places, whereupon "they are said to be *localized*, or *local legends*" (Brunvand 1978, 106). Finally, the Brown Mountain Lights have been claimed by some mountain folk as a form of divine warning (Norman and Scott 1995, 266–267).

2. 1913–1960: Records and Theories. The first known reference to the lights in print was in the September 13, 1913, *Charlotte Daily Observer*.[3] In 1913 a U.S. Geological Survey geologist concluded the lights were those of locomotives, while a U.S. Weather Bureau report of 1919 explained the phenomenon as an electrical discharge compared to South America's "Andes Light," although the writer had not actually visited the site.

A serious investigation was carried out in 1922 by geologist George Rogers Mansfield (1922, 18), who spent two weeks in the area. His report concluded that the lights were "clearly not of unusual nature or origin" consisting of automobile headlights (about 47 percent), locomotive headlights (33 percent), and stationary lights and brush fires (10 percent each). While others have postulated swamp gas, luminous electrical discharge, mirages, and still other possibilities (Warren 2014, 11, 20), Mansfield discredits such phenomena.

Figure 1. The author at Brown Mountain, NC (the plateau-like ridge to the right). (Author's photo by Diana Harris.)

He called attention to the unstable atmospheric conditions in the basin-like area that is almost surrounded by mountains.

Mansfield perhaps too quickly dismissed the suggestion that some lights were mirages. Yet he called attention to the unstable atmospheric conditions in the basin-like area that is almost surrounded by mountains. With dense air comes an increase in refractiveness (the bending of light waves). Fine particles like dust and mist can obscure and scatter the refracted light, as well as impart to it the yellowish and reddish tints that are often reported. Therefore the light is especially active during a clearing spell following a rain, as many observers have noted. When the mist becomes quite dense, the light is obscured. The effect of the variations in atmospheric density is to sometimes increase and at other times diminish the lights' intensity. Thus a light may suddenly appear then effectively disappear, as frequently observed (Mansfield 1922, 7–15). In his conclusions Mansfield (1922, 16) reasoned:

> As the basin and its atmospheric conditions antedate the earliest settlement of the region, it is possible that even among the first settlers some favorably situated light may have attracted attention by seeming to flare and then diminish or go out. As the country became more thickly settled the number

> of chances for such observations would increase. Before the advent of electric lights, however, it is doubtful whether such observations could have been sufficiently numerous to cause much comment, though some persons may have noted and remarked upon them.

3. After 1960: UFOs and Other Paranormalities. Although legends mostly interpret the Brown Mountain Lights as ghosts, since about 1960 tales of UFOs, alien contact, and "interdimensional beings" have proliferated there, as well as of "little people, fairies and such" (Warren 2014, 8). For example, a local man named Ralph Lael claimed to be in telepathic communication with the lights, which he said directed him to a secret crystal-filled cave. From there, he said, alien humanoids from a planet called Pewam took him on space trips as they advised him how to save Earth. Lael operated the Outer Space Rock Shop Museum, where he exhibited an "alien mummy." A grainy photo shows it looking for all the world like a carnival sideshow fake. However, since Lael died, the whereabouts of the "creature" have become unknown (Warren 2014, 5, 15).

In 1990, a book by "Commander X" identified Brown Mountain as one of several other "underground alien bases" (Warren 2014, 15). Thus Brown Mountain is counted among such extraterrestrial conspiracies as the MJ-12 crashed-saucer reports, animal mutilations, Men in Black, and claims of secret bases on the moon.

Meanwhile, the lights' early folkloric identity as ghost lights resurfaced as part of the ghosthunting craze of modern times. Thus amateur enthusiasts are drawn to the mountain as to an old house, graveyard, or other "haunted" site.

We see not only that the Brown Mountain Lights have evolved but that they have done so as cultural beliefs and expectations changed. It appears that as the lights were adapted first to the isolated local lore, they later began to be influenced by various encroachments—migrating folktales, visits by outside scientists and others—and finally they attracted fringe notions from America's burgeoning UFO and ghost-hunting mythologies.

Ghost light promoters will be quick to say that we did not see the "true" Brown Mountain Lights, but which are they?

Investigating on Site

Various sites offer views of Brown Mountain, which is a flat-topped or "plateaulike" formation with a maximum elevation of approximately 2,600 feet. However, we chose the overlook on highway 181, which is described as "by far the best spot to see Brown Mountain" (Warren 2014, 18). (Again, see figure 1.)

Following a picnic dinner at the site in the early evening, I was sitting in the car when I saw an extremely bright flash on the mountainside. Startled, I got out and immediately realized that I had seen a firefly! I was later amused to learn that "some have even attributed the lights to giant fireflies" (Warren 2014, 16) or, more reasonably, on rare instances, to fireflies flying near a person "yet appearing unduly large because his eyes were focused on the distant hillside" (Mansfield 1922, 6).

As dark set in, I interacted with several people there, mostly from a family who looked for the lights with me. We saw, in addition to airplanes, lights that we attributed to automobiles and to Morganton town lights, as well as to a distant tower's red flashing light. Ghost light promoters will be quick to say that we did not see the "true" Brown Mountain Lights, but which are they?

The lights are reported in widely varying descriptions. One source (Loven et al. 1908) encountered a light "like a toy fire balloon, a distant ball . . . much smaller than the full moon, much larger than any star and very red." Another (Perry 1919) stated he saw a "glowing ball of light, slightly yellow and lasting half a minute." Again, a witness (Gregory n.d.) described a light "like a ball of incandescent gas, in which a seething motion could be observed." Still another (Harris 1921) reported "a pale white light, as one seen through a ground glass globe," having a halo around it.

At least those describe single, orb-like lights, despite the different colors. These are ever-changing; states Warren (2014, 2–3): "The lights frequently begin as a red glow, flaring into white. They can also appear as orange, blue, green or yellow." A light can last from six seconds to over a minute, "especially when floating into the air over the ridge." Also, rather unpredictably: "One orb can divide into several, the smaller ones eventually combining to form a large one again. They might seem to 'ooze' around the trees and drift over the ridge; dwindle and fade away, or simply wink and vanish."

Yet again, according to a pair of writers who acknowledge that "Descriptions vary from one observer to another" (Norman and Scott 1995, 266): "A minister described the light as cone-shaped and larger than a star. When two more arose, he, and his sons who were with him, watched through field glasses. The lights rose high in the sky and terminated."

Moreover, the lights are reported in a still more bewildering variety, for example as "red and white shooting lights" (Hauck 1996, 311), "the fey array of lights dancing before the slopes of Brown Mountain," and "like flaming balls shooting from a roman candle," as well as "multi-colored orbs

of light [that] appear to rise higher and higher in the air, sometimes darting about, sometimes zooming straight up the slopes" (Coleman 2011, 173). As well, they are "sometimes moving so fast and in such numbers that it is impossible to count them all. Some lights fade away as they rise; others, however, expand as they ascend and then burst in mid-air like silent fireworks" (Coleman 2011, 173–174).

Mystery Still Solved

Apparently unaware or unconvinced of the powerful effect of the atmosphere on lights, one proponent of the mystery insists that "the paranormal lights … often move in strange ways and can change color before your eyes, unlike the stationary lights from normal sources, or car lights that always move on the same route" (Warren 2014, 18). It is easy to be mystified. Experts in the causes of nocturnal light UFOs know this well. Allan Hendry (1979, 26) notes that not only color change but motion effects can be created by atmospheric refraction, turning, for example, a celestial light into a flying saucer, and something as simple as a cloud can cause "dramatic 'disappearance' acts."

In 1977, a visiting team of scientists from Oak Ridge National Laboratory aimed a distant arc light to a point west of Brown Mountain where observers waited. The blue-white beam appeared as an "orange-red orb apparently hovering several degrees above Brown Mountain's crest." The scientists concluded that most of the sightings were indeed refractions of lights in the distance (Clark 1993, 55). This supports Mansfield's observations and deductions of 1922.

Several more recent researchers have also spent time studying the lights, only to conclude that they were produced by campfires, vehicle headlights, airplanes, and distant town lights. One researcher called attention to a few reports that could describe the rare phenomenon of ball lighting (Washburn 2012). Moreover, the lights are not limited to Brown Mountain but in fact have been reported throughout the entire area (Warren 2014, 2).

Proponents of the "mystery" are quick to challenge the scientific explanations. But as Rosemary Ellen Guiley (2000, 156) acknowledges, "Ghost lights have a power to fascinate, and some individuals who see them do not want the mystique spoiled by an explanation." Neither do writers selling mystery. Whenever one explanation is offered, they describe other eyewitness reports (or alleged reports, since often no sources are given) that supposedly rule out that cause. They suggest, therefore, that no scientific explanation solves the "mystery" of Brown Mountain (Coleman 2011, 176; Floyd 1993, 57–58). We should refuse to fall for such tricks. The evidence is clear: *There is no single explanation because there is no single phenomenon*. Just as we know that not all UFOs are weather balloons, not all Brown Mountain lights have a single cause.

Certainly, automobiles, trains, and other mundane sources have been responsible for most of the lights. The response of locals, relying on folklore—that the phenomena occurred long before there were such vehicles—is based on "exceedingly slight" evidence (Clark 1993, 55). More recently have come various potential light sources, such as off-road vehicles (ORV) and campers that "are commonly mistaken for paranormal illuminations"—an ORV park having been installed in the mid-1980s (Warren 2014, 7, 14).

As with UFOs, some lights will remain unidentified—not because they are inherently mysterious but because they are just eyewitness reports or snapshots with so many variable factors. But to claim that something unknown (negative evidence) is therefore paranormal is to engage in the logical fallacy of arguing from ignorance: drawing a conclusion from a lack of knowledge. Consider this the next time Brown Mountain "researchers" engage in their mystifications. ■

Notes

1. Such ghostly phenomena, often witnessed as dancing lights, are known variously as will-o'-the-wisp, jack-o'-lantern, etc. (Haining 1993, 126).

2. St. Elmo's fire is a luminous electrical discharge, sometimes seen during stormy weather at prominent points of a ship or airplane.

3. A claim by the careless Coleman (2011, 174) that in 1771 William Gerard de Brahm, then British colonial surveyor general of the South District of North America, was "the first white man to view the lights" is untrue. He was simply trying to explain some loud noises in the mountains as spontaneous igniting of "nitrous vapors" (Warren 2014, 4).

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Hanging Out with *Hangar 1*

Each year the Mutual UFO Network, the largest UFO group in the United States (and probably the world) holds an "International Symposium," bringing together UFOlogy's best and brightest (such as they are). The 2015 meeting was held in Irvine, California, conveniently close to MUFON's shiny new headquarters in Newport Beach. If you watch MUFON's abysmally sensationalized TV program *Hangar 1* on the History Channel, you would think that MUFON keeps thousands of UFO case files in some huge aircraft hangar (think of that scene at the end of the *Raiders of the Lost Ark* where the newly found Ark of the Covenant gets lost again inside a cavernous storage building). That hangar actually exists; it is located at Lunken Airport in Cincinnati, Ohio. It belongs to David McDonald, who was MUFON's executive director from 2012–2013. For a short time some UFO files were stored in it, but since August 1, 2013, MUFON's director has been Jan Harzan, and its offices and files are now in California. While MUFON is quite close to Orange County's John Wayne Airport, so far as is known it has no aircraft hangar there, and the show's claim that MUFON's supposedly voluminous UFO files are stored in a cavernous aircraft hangar is just as bogus as the rest of that show.

The proceedings began with the announcement by Harzan that MUFON's founder, Walt Andrus, had died just a week earlier at age ninety-four. The keynote speech was given by Paul Hellyer, former Canadian defence minister, who at ninety-two is nearly as old as was Andrus but is remarkably spry and energetic. Hellyer does not claim to have learned about UFOs decades ago during his political career, but much more recently from TV programs and books. He reads some of the most sensational UFO material, checks with some supposed "reliable source," then proclaims that it's all true. Among the claims supported by Hellyer are reverse-engineered technology from the crashed Roswell saucer, a personnel exchange program with aliens of the planet Serpo, chemtrails, and 9/11 conspiracies (http://goo.gl/v37JZ7).

The regular sessions began with Marc D'Antonio, MUFON's chief photo/video analyst, who works in producing models and video effects (http://www.fxmodels.com) and thus is highly qualified to detect hoaxing and digital artifacts. D'Antonio ac-

Paul Hellyer, former Canadian Defence minister from 1963 to 1967.

knowledges that we don't have solid, tangible proof of UFOs, but he thinks it can be obtained with the right instrumentation. This was tied in with the next talk by Robert Schroeder, who used highly speculative physics to try to get around the otherwise-insurmountable problem of traveling interstellar distances in the span of a human lifetime. This involves string theory, the multiverse—other dimensions or even other universes, right "next door" to our own—micro black holes, and something called KK gravitons. Supposedly UFOs pop over to the other "Brane"—wherever that is—in which distances are shrunk relativistically because in that universe gravity is as strong as the other three fundamental forces. In the gravity "Brane," Alpha Centauri could be only twenty-five miles away! (Why UFOs are not squashed flat by all that giga-times gravity is never explained.) Working with special effects guru Doug Trumbull, D'Antonio is developing a multiple sensor device called UFOTOG II that will look for anomalous objects not only visually but with magnetometers, gravity meters, spectroscopy, gamma ray, and other detectors (https://goo.gl/OaGjx5). Large numbers of them will be manufactured to get the costs down, and they will be placed on top of poles in areas where UFOs are being reported. Communicating via cell phone towers, their detection of radiation or magnetic events associated with anomalous objects might confirm that UFOs are "punching in" or out of other dimensions, as reportedly permitted by string theory.

Where should the UFOTOG II detectors be placed to have the best chance of detecting TRUFOS (True UFOs), assuming that such things exist? Linda Zimmerman spoke about "Hudson Valley UFOs," going back all the way to "mysterious airship" sightings in 1909. That region in upstate New York has been a veritable hotspot of UFO sightings for decades. And while she acknowledges a few such sightings might be explained by a group of mischievous pilots of ultralight aircraft, she insists that the great majority of them cannot. Her rich regalia of UFO reports included numerous alleged close encounters, and even claims of the Air National Guard harassing alleged UFO witnesses. Afterward I complimented her on her entertaining presentation but wondered how many of those claims should actually be taken as fact. She smiled and replied, "Well, that's the caveat I gave at the beginning of my talk."

Preston Dennet gave a talk titled "Are There Undersea UFO Bases off the California Coast?" (Obviously the answer is supposed to be affirmative.) He noted that the celebrated UFO abductee Betty Andreasson claimed to have been taken to a UFO base under the water (the aliens could, I'm sure, have zipped her from Massachusetts to California in the twinkling of an eye). People claim to have seen UFOs entering or leaving the water. Many UFO sightings center on Topanga Canyon, where UFOs have been literally menacing drivers along the road. The underwater UFO base appears to be somewhere between Santa Barbara and Santa Catalina—perhaps another spot to place the UFOTOG detectors.

MUFON has pulled some of the most discredited stories in all UFOlogy out of the dumpster and hyped them with breathless excitement.

A major theme advertised for the 2015 Symposium was the participation of the cast of *Hangar 1*, MUFON's unfortunately all-too-successful descent into the realm of tabloid television, now in its second season. Typical "revelations" include standard tabloid trash fare: *President Eisenhower Met with Aliens! The Nazis Established a Flying Saucer Base in Antarctica! The U.S. Military Has Captured Live Aliens from Saucer Crashes!* MUFON has pulled some of the most discredited stories in all UFOlogy out of the dumpster and hyped them with breathless excitement. (For a hilarious collection of *Hangar 1* claims by MUFON's John Ventre, see https://goo.gl/TEuEOl.) None of these esteemed cast members actually did any presentations; instead we were treated to a "*Hangar 1* Hangout: Meet the Cast and Crew of *Hangar 1*." Best-known among them is Dwight Equitz, who appeared as if from nowhere in the first season, billed as a "UFO Researcher." At the time, no one had heard of this "researcher." A little digging quickly revealed that he was not a UFO researcher but an actor hired to read whatever absurd lines he was given. I introduced myself to Equitz, who disavowed any great UFO expertise, at least in comparison with the MUFON cast members, when I joked about him being a "UFO researcher." I told him that I had found it necessary to criticize him and others from *Hangar 1* on my *BadUFOs* blog, and gave the example of that Nazi Saucer Base in the Antarctic. This did not seem to trouble him. "But write something good, too," he requested. I have thought about that, and here is the best I can do: "The special effects are pretty entertaining." I could not find anything else good to say about *Hangar 1*.

Perhaps the most anticipated talk at the symposium was that of Mexican UFO promoter Jaime Maussan, who had orchestrated the presentation of the "Roswell Slides"—photos of a mummy in a display case being hyped as a dead Roswell alien—on Cinco de Mayo (see this column, September/October 2015). Some people think Maussan should be tarred and feathered for all of the embarrassment he has

brought upon "serious" UFOlogy. He began his talk titled "Video Evidence That UFOs Are Real" with his usual collection of dubious or hoaxed photos and videos of UFOs. This was followed by claims about aliens, orbs, bleeding statues, UFOs flying into a volcano, and apocalypse sounds—I think it was largely the same talk he gave at the UFO Congress near Phoenix in February. Suddenly he broke off from presenting his usual twaddle and launched into a spirited defense of his actions concerning the Roswell Slides. He told how he consulted his "experts," who insisted that the body was not human. Maussan listed some of the bones that are missing, as if poorly wrapped mummified bodies do not tend to fall apart. He then showed a six-minute video he had prepared, claiming that the body is not a mummy and has not been identified. Maussan did acknowledge, however, that the de-blurred placard accompanying the body does indeed read "MUMMIFIED BODY OF TWO YEAR OLD BOY." He did not explain why the body of a space alien might be placed in a display case in a museum, with a placard proclaiming it to be a mummy.

Suddenly Maussan broke off from his usual twaddle and launched into a spirited defense of his actions concerning the Roswell Slides.

Maussan was followed by the "Flying Saucer Physicist" Stanton T. Friedman, speaking on "Making UFOlogy Respectable." UFOlogy is *already* respectable, Freidman insisted, and we want to make it *more respectable*. Then he launched into one of his standard canned speeches about government UFO cover-ups, Blue Book Special Report 14, and using nuclear fusion propulsion to reach the stars. Friedman "downsized" his claim about the Fish interpretation of Betty Hill's "UFO star map." Now that it has been shown that the old Gliese II star catalog the map was based on contains some significant errors concerning the distances of the selected stars, Friedman can no longer claim an "amazing resemblance" between the two patterns (which was largely illusory, anyway). Now he is reduced to marveling how close Zeta 1 and Zeta 2 Reticuli are to each other, even though there is no longer any basis for arguing that they have anything to do with the "star map" Betty drew. He wryly remarked that, in the collection of arch-skeptic Phil Klass's papers that is now in the American Philosophical Society in Philadelphia (http://goo.gl/72mWCl), "there is no Friedman file," implying a cover-up of some sort. But there is also no Sheaffer file in it, and I corresponded with Klass at least as much as Friedman did. However, we do find files listed for people whose correspondence with Klass was probably quite limited. I don't know why that is the case, but it's hard to imagine it as any kind of cover-up.

At the conclusion on Sunday evening, it was announced that MUFON's next symposium would take place in Orlando, Florida, in August 2016. Afterward, Lee Spiegel of the *Huffington Post*, Marc D'Antonio, a few others, and I were frantically wandering the grounds of the hotel looking for a place where we could watch the so-called "Blood Moon" eclipse, very low in the sky for west coast viewers, and for us hampered by clouds. We finally found a spot where we could set down my little Celestron First Scope and get a decent view of the eclipse. Somehow, the End of the World that some had predicted failed to occur, so we all breathed a sigh of relief and headed home. ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

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Have You Seen the Toucan Man?

Q: **"I'm a student at a college in Illinois. I'm contacting you about a personal experience with an urban legend that haunts me. Do you know anything about the Toucan Man, a sinister figure who abducts children in Costa Rica? I may have encountered him."**

—A. Susemihl

A: This query was originally sent to the eminent folklorist Jan Harold Brunvand, who due to an illness was unable to fully respond and forwarded the email to me for any insight. I replied to her requesting more details and soon got the following response:

When I was thirteen, I went on a summer trip with my middle school to Costa Rica. At one point we stayed at the Cloud Forest Lodge in Monteverde. It was beautiful and totally remote. That night, while trying to fall asleep, I kept hearing what sounded like a flute coming from my back door. My bunkmate was asleep and I would periodically wake her up and ask her if she heard it too. She never heard anything. This flute playing happened three or four times, and I thought it was extremely odd, but a girl on my trip had bought a wooden flute that day so I figured it was her, despite the late hour. The flute periodically continued very late into the early morning. I was getting very scared. I was too afraid to get out of bed and open the door to see what it was. I finally started to drift asleep and had a horrible vision of this tall dark figure appearing from the corner of the room, approaching me, and then strangling me. I woke up screaming. I had never had a dream this vivid before. I actually felt the pressure on my chest.

The next morning we had breakfast with my class and the hotel owner. I explained my story and my teacher laughed at me, though the owner had told me that the Cloud Forest is notoriously haunted. And the girl who bought the flute said she had not played last night. Fast-forward a few years to my junior year of high school. I was in a speech class and one of our assignments was to recreate a story or experience we had. A group of three girls in my class had just returned from Costa Rica and decided to do their project together. During their performance they told the legend of the "Toucan Man." They explained that their tour guide told them the legend of the Toucan Man, a man in the forest who hypnotizes children with a flute and kidnaps them, sometimes for a short period of time and sometimes forever. Their tour guide had claimed to be taken by the Toucan Man, and she lifted her shirt to expose huge scars of gashes on her back. He enticed her into the woods with his flute, and she returned four days later with no recollection of what happened. I was so frightened that I had tears in my eyes. I am curious if you know anything about this urban legend or a similar one. I'm looking for answers and some sort of closure.

Intrigued and wanting to help, I spent several hours researching the question. It sounded like a collection of different things are at play, lumped together into one mystery. As is often the case in mysterious and seemingly paranormal events, things that may appear to be linked in our minds are often not (hence the logical fallacy of *post hoc ergo propter hoc*, or "after this, therefore because of it"), and hence some unpacking of claims is in order.

As it happens, I've traveled extensively in Latin American and visited the Monteverde Cloudforest several years ago. I don't recall hearing any legends about a "Toucan Man," nor does it appear in any of my books on Caribbean or Central American folklore (nor, for that matter, could I find anything on it on the web). That doesn't mean it doesn't exist, of course, but it seems more likely that the story she heard is a garbled version of another common story native to the region. I'll come to that later.

I remember hearing flutes in Monteverde; touristy places often have flutes for sale (as noted, a girl on her trip bought one), and in many hostels and hotels (especially in the lobby) there's some ambient ethnic music playing from CDs (for sale of course). And some nearby locals may play the

A sculpture representing a mythical Duende.

flute for tourists or themselves. The fact that she heard a flute[1] by itself isn't remarkable or unusual, even late at night. It's not clear why a few bits of late-night flute-like sounds from somewhere else in the hotel or outside would terrify the writer (other than perhaps being a thirteen-year-old girl in a foreign country) but since she was "very scared" it's not surprising that she might have had a nightmare.

What she described sounds very much like a nightmare, waking dream, or sleep paralysis, including the mysterious unexplained pressure on the chest and feeling like some unknown force or entity is touching or pressing down on you. It's scary and strange but harmless and sometimes called the Old Hag syndrome (see Hufford 1982). From her description that's almost certainly the psychological phenomenon responsible. As to the rumor that the Monteverde hotel is haunted, there are thousands of supposedly haunted hotels all around the world; Joe Nickell has written about many of them in his columns and articles, as have I (e.g., Radford 2014). I wouldn't associate either the flute sound or the sleep paralysis nightmare to that, since they happen all the time in non-haunted hotels and houses.

The Toucan Man

As for the "Toucan Man" the girls in the speech class talked about, it's possible they simply made it up (it wouldn't be the first time that students faked a story for a grade!), though more likely the Costa Rican tour guide passed along a well-known legend to them and they got the details wrong (this is a version of the friend-of-a-friend tale in which narratives commonly go astray). That legend is not of a "Toucan Man" but instead the Duende—a magical man of Central American folklore who is said to live in the forest and sometimes abduct children (and usually return them, hours or years later). The Duende is well known (and widely believed) throughout the region; I encountered people who believe in the Duende in Belize, and in 2009 when searching for the chupacabra in the jungle along the San Juan river (forming the border between Nicaragua and Costa Rica; see Radford 2011) our tracking guide said he had been abducted by a Duende—and then returned—as a baby.

Those who are abducted by Duende (like those abducted by fairies—see Silver 1999) often have no memory of it. Significantly the Duende uses music to enchant people and signify his presence, though typically he plays guitar, not a flute. However, several legends state that the Duende is also associated with a whistling, flute-like sound. As for one version of the Duende common in Belize, Tata Duende, "His approach is heralded by a whistling sound much like that of the wind" (*Characters and Caricatures in Belizean Folklore* 2008, 27) and "The most noted characteristic of the *duenditos* . . . is that they whistle constantly at night, filling the air with their realistic imitation of the winds" (*Characters and Caricatures in Belizean Folklore* 2008, 19). The supposedly supernaturally sourced whistling sound at night could have very easily migrated from a whistle to a flute in folklore.

The Duende figure is similar in many respects to the Irish leprechauns (including his diminutive stature, trickster nature, and guarding treasure) and English fairies; for more information on the Duende see Hagerty and Parham 2004. As Jan Brunvand noted to me and the writer in this curious tale, there are also echoes of the classic Pied Piper of Hamelin story (e.g., Mieder 2007; Polidoro 2008) in which a flute-playing malcontent abducted children. I see no connection at all between the flute (or flute-like sound) she may have heard at night in the Monteverde hotel, her sleep disturbance, and the mysterious Toucan Man she later heard about from fellow classmates.

In conclusion, my best guess for this mini-mystery is one or more of the following scenarios: Either the Costa Rican tour guide had a bit of a joke on the writer's classmates, telling them a scary story that wasn't really a legend (complete with unrelated scars as "proof"); the tour guide mangled or changed a Duende legend and added the toucan twist; the girls were told a Duende story more or less accurately, but got some details wrong (or just decided to embellish) when they retold the story for a high school speech project; or perhaps most likely the "Toucan Man" is simply a local or regional name for the Duende, retold and accessibly Anglicized for American tourists. ■

Note

1. If indeed it was a flute; she just said it "sounded like" one but of course never saw the source, nor is it clear there was any accompanying melody, song, or instrumentation to the sound.

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[THE SCIENCE OF SCIENCE COMMUNICATION

MATTHEW NISBET

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The *X-Files* Effect?

Research Suggests We Shouldn't Worry so Much over the Hit TV Series

The X-Files returns January 24 to Fox Television in a special six-episode revival of the popular series. Actors David Duchovny and Gillian Anderson reprise their iconic roles as FBI agents Fox Mulder and Dana Scully, investigating a collection of paranormal cases designated "X" for "unexplained."

Premiering in 1993, *The X-Files* ran for eight seasons, averaging nearly twenty million viewers at the height of its popularity. The series ended in 2001 but was followed by two X-Files movies that grossed a combined $260 million worldwide. Over the years, the X-Files fan base has multiplied, spread by way of syndication on cable TV, video and DVD editions, streaming on Netflix, and spin-off comic books and video games.

Not surprisingly, there is intense anticipation for the re-launch. There are even rumors of a possible new TV series featuring a younger generation of characters and a third movie.

But given its legacy and plotline, *The X-Files* revival is sure to generate concerns about the effects of the series on public perceptions of scientists, science, and the paranormal. Such concerns are not new.

Since as early as the 1970s, scientists and skeptics have criticized entertainment, television, and film portrayals for promoting negative stereotypes about scientists, featuring improbable or inaccurate scenarios and depictions, and contributing to anti-scientific beliefs.

Many arguments that Hollywood presents scientists and science in a consistently negative light tend to rely on outdated research.

When I worked for Skeptical Inquirer in the late 1990s, I was among the many pressing the case against *The X-Files*. "By thrusting his horror claws deep into the spine of American culture," series creator Chris Carter was responsible for "historic levels of interest in conspiracies and the paranormal," I warned (Nisbet 1998).

Yet as I left the magazine to go to graduate school, I began to conduct and write about research that painted a far more complex, shifting portrait of how science and scientists are portrayed by Hollywood, offering some surprising results on how such depictions shape viewer perceptions. The findings relative to paranormal beliefs are equally counterintuitive.

Mad, Bad, or Heroes?

Many arguments that Hollywood presents scientists and science in a consistently negative light tend to rely on outdated research, citing as evidence a study of portrayals from the mid-1980s led by communication researcher George Gerbner (1985). His study indicated that in comparison to other occupations, scientists featured in primetime television suffered a higher ratio of negative stereotypes and were more likely to be victims of violence.

Yet in a follow-up analysis, Gerbner and colleagues (1999) concluded that based on data collected during the mid-

1990s, "there is no basis to claim that any kind of systematic negative portrayal of scientists exists. Changes have occurred in Hollywood since the time of our initial study, which found scientists to be typically evil, disturbed, sexually dysfunctional villains.... This is no longer the case."

More recent analysis of TV content confirms and updates these findings. A study led by communication researcher Anthony Dudo (2010) indicates that between 2000 and 2008, more than eight out of ten scientist characters featured in primetime television were depicted in a strongly positive light.

Few studies have addressed directly how the image of scientists in entertainment media impact stereotypes about scientists. A study by psychologist Susan Losh (2010), however, does provide relevant correlational evidence to consider. As entertainment portrayals across years have shifted from more negative stereotypes to more positive portrayals, so have the stereotypes held by American adults.

In comparison to 1985, Americans in 2002 were far less likely to hold negative stereotypes about scientists and were much more likely to believe that a career in science was a desirable choice for their children or for themselves. A recent study by communication researcher John Besley (in press) extended the analysis to 2012, identifying a further decline in negative stereotypes and an improving public image of scientists.

The science-fiction audience is by nature strongly enthusiastic about science, meaning that their viewing habits may capture an underlying latent support for science.

Entertainment Television and Perceptions of Science

Studies I have conducted, along with those by several colleagues, have examined the direct connection between TV viewing and more generalized perceptions of science.

Analyzing survey data from the 2000s, heavier viewers of entertainment television held stronger reservations about the impact of science on society, but they were also more likely to score higher on belief in science as contributing to societal progress (Nisbet et al. 2002; Dudo et al. 2010).

These findings suggest that the effects of TV viewing reflect the dual imagery of science in entertainment. In this case, science is often depicted as mysterious, magical, or dangerous with both positive and negative consequences for society. Given this duality in narratives, not all entertainment programming has been found to have the same effects. Somewhat counterintuitively, heavier viewers of science fiction programs, controlling for a number of confounding factors, *tend to be more positive* in their views of biomedical research, agricultural biotechnology, and science more generally (Nisbet and Goidel 2007; Besley and Shanahan 2005).

The science-fiction audience is by nature strongly enthusiastic about science, meaning that their viewing habits may capture an underlying latent support for science. Repetitive viewing of science fiction simply strengthens this orientation, further cultivating an audience naturally receptive to new scientific innovations. A second possible factor is that by familiarizing viewers with the moral dimensions of scientific advances, science fiction may in fact defuse audiences' intuitive anxieties and negative emotional reactions (see Nisbet and Dudo 2013).

TV Dramas, Reality TV, and Paranormal Beliefs

Other studies have examined directly the relationship between forms of entertainment media use and belief in the paranormal. Yet in these studies, when it comes to fostering extraordinary beliefs, one-sided news media depictions and reality TV programs appear to play a more influential role than dramatic series such as *The X-Files*.

In a survey study led by communication researcher Glenn Sparks, individuals who reported viewing a mixed diet of TV dramas such as *The X-Files* and reality programs such as *Early Edition* were more likely to profess belief in a range of paranormal claims. Yet these findings came with an important caveat: The relationship between TV viewing and belief was only significant among those viewers who reported prior personal experience with the paranormal.

The relationship between personal experience and TV viewing led Sparks and his coauthor to suggest that future research should examine the unique role of reality TV programs and pseudo-documentaries in cultivating paranormal beliefs. In contrast to dramas such as *The X-Files*, these programs might have a more pronounced impact on beliefs given their perceived grounding in "real life"

events (Sparks and Miller 2001).

Building on this work, in a recent study of 500 undergraduate students, political scientist Paul Brewer (2013) asked about their paranormal beliefs, personal experience with the paranormal, and forms of media use. His results suggest that paranormal themed reality TV viewing is strongly related to belief in the paranormal, but no such connection was observed for viewing dramas such as *The X-Files*.

Interestingly, in contrast to Sparks's findings, the effects for reality TV viewing were significant across all students, regardless of whether or not they reported a prior experience with the paranormal.

Conclusion

In a now-famous address to the American Association of the Advancement of Science, *Jurassic Park* creator Michael Crichton (1999) argued that in the entertainment media, "negative and distorted views of scientists and the scientific method are inevitable," and that "worrying about it is a lot of hot air," amounting to a form of ritual abuse among the scientific community. For Crichton, scientists could better deploy their time and resources by focusing on improving news media presentations, solid advice in light of today's research findings.

Since the 1990s, portrayals of science and scientists in the TV dramas have been trending more positive, if not promotional. The effects of such presentations are more complex and less predictable than many scientists and skeptics assume, even in some cases cultivating a stronger belief in the promise of science and acceptance of specific scientific advances.

Research also suggests TV dramas such as *The X-Files* may have only a limited, and often difficult-to-discern, influence on beliefs in the paranormal. Instead, one-sided or falsely balanced news presentations in combination with the ubiquitous number of paranormal-themed reality TV programs and pseudo-documentaries may be a much greater cause for concern and therefore should be the primary focus of outreach efforts. ■

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From Our Archives

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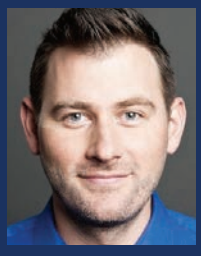
POINT OF INQUIRY WITH JOSH ZEPPS & LINDSAY BEYERSTEIN

For in-depth interviews with the most fascinating minds in science, religion, and politics, join *Point of Inquiry* cohosts Lindsay Beyerstein and Josh Zepps at pointofinquiry.org.



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Lindsay Beyerstein (cohost) is an award-winning investigative journalist and staff writer for *In These Times*. Her work has appeared in places such as *The New Republic, Reuters, Slate, Salon, Ms. Magazine*, and *The New York Press*. Wait to see what stories she tells with her guests on *Point of Inquiry*.

THE LIE DETECTOR TEST REVISITED

A Great Example of Junk Science

Although the polygraph can be useful in coercing confessions, it is based on scientifically implausible assumptions of accuracy and is biased against the innocent. The scientific community justly considers it pseudoscience, and it should be abandoned.

MORTON E. TAVEL

Recently I came across one of television's true crime programs that presented a provocative example from actual case files: A woman had been brutally murdered in her apartment. Her former boyfriend with whom she had recently had a vigorous altercation became the leading murder suspect. During the investigation, this man was "offered" a polygraph (lie detector) test in the attempt to establish his likely guilt or innocence. He agreed to be tested and was found to have "failed," thus presumably indicating his likely guilt.

Despite this result, the evidence presented at the trial was deemed insufficient for a guilty verdict, and he was acquitted. Convinced that the polygraph test was accurate, his local community made him a pariah; he was shunned and even threatened with bodily harm. Several months later, however, another man, the actual murderer, was apprehended and convicted. Thus at least for this first suspect, despite his ordeal, the story had a satisfactory ending, and the lie detector test itself proved inaccurate and misleading. This outcome leads to an obvious question: How often does "lie detection by machine" prove false?

Much of the American public seems to be convinced that the "lie detector" is valid, as indicated by its ubiquitous use in "whodunit" literature and on television crime, psychology, talk, and news shows. After all, faced with such an avalanche of widespread approbation, who could doubt the validity of such a test? Supporting this illusion is the fact that federal, state, and local police departments and law enforcement agencies across the United States are generally avid proponents of this method.

But let's take a closer look at this subject. Questions about the accuracy of this test should be amenable to modern scientific methods. Interestingly, this challenge is strikingly similar to those we face regularly as medical researchers and practitioners when we evaluate various tests in the attempt to establish the presence or absence of many diseases. Through this lens, therefore, I can provide some insight on a method that is often uncritically analyzed.

The Procedure and Its History

The "lie detector" test has been used for nearly a century, and it employs a "polygraph," which, during questioning, continuously records an examinee's blood pressure, respiration, pulse rate, and skin resistance (an indirect measure of perspiration).

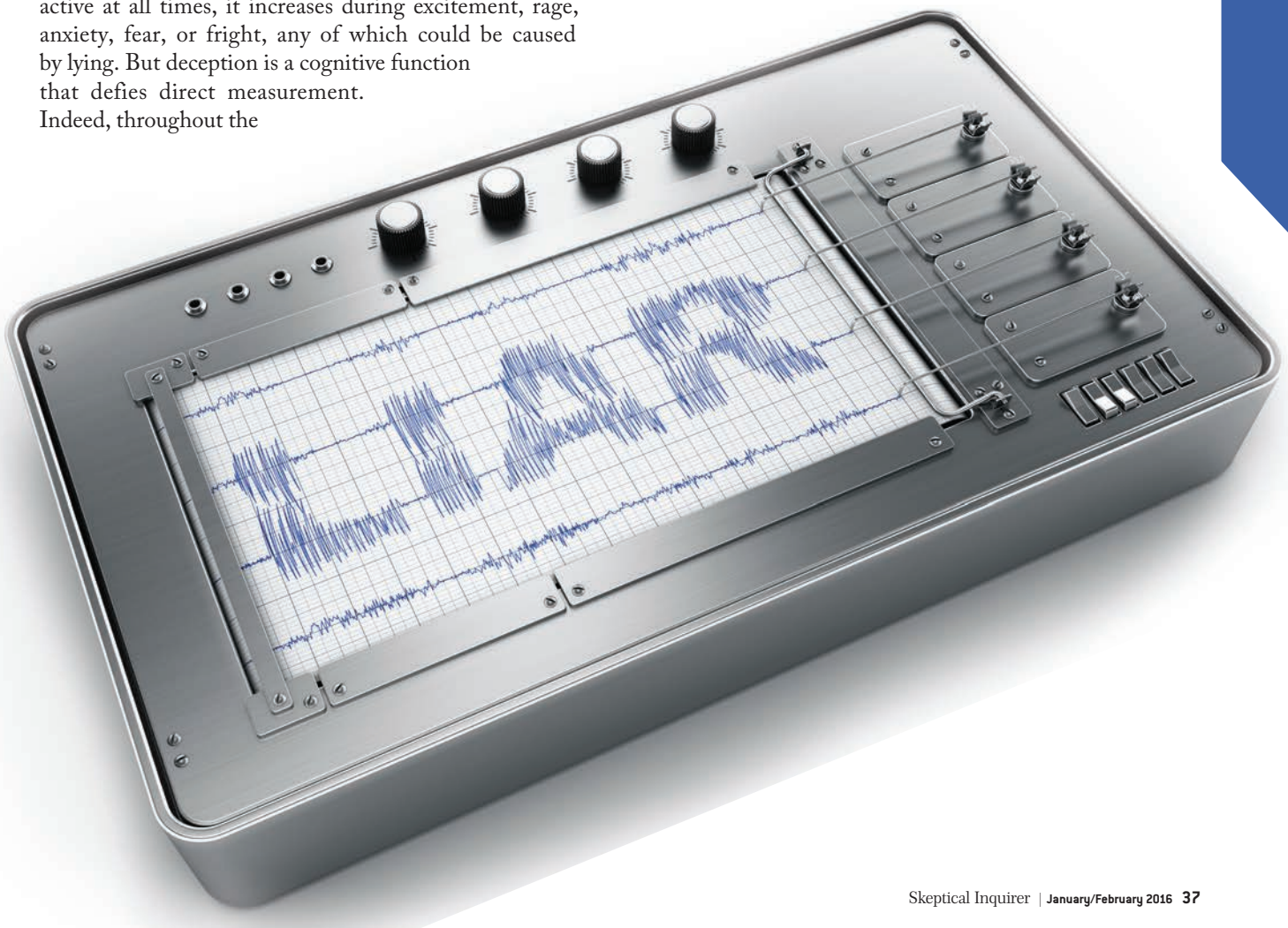
The usual format compares responses to "relevant" questions with those of "control" questions. The control questions are designed to control for the effect of the generally threatening nature of relevant questions. Control questions concern misdeeds that are similar to those being investigated, but refer to the subject's past and are usually broad in scope; for example, "Have you ever betrayed anyone who trusted you?"

A person who is telling the truth is assumed to fear control questions more than relevant questions. This is because control questions are designed to arouse a subject's concern about their past truthfulness, while relevant questions ask about a crime of which they are suspected. A pattern of greater physiological response to relevant questions than to control questions leads to a diagnosis of "deception." Greater response to control questions leads to a judgment of no deception. If no difference is found between relevant and control questions, the test result is considered inconclusive.

In the effort to improve the test's accuracy, alternative means of questioning have been suggested, such as the "guilty knowledge test" (Ruscio 2005). Rather than attempting to determine the truthfulness of an examinee's responses to relevant items, this technique aims to expose "hot" responses to questions only a guilty individual could display. This is done with a series of multiple-choice questions, one of which contains the incriminating information. This type of interrogation is limited only to instances of specific wrongdoing, but it has not been sufficiently investigated and is quite likely to suffer from the same shortcomings as the conventional procedure.

The test records the activity of the sympathetic branch of the autonomic (involuntary) nervous system that influences heart rate, respiratory rate, blood pressure, and perspiration. Although this part of the nervous system is active at all times, it increases during excitement, rage, anxiety, fear, or fright, any of which could be caused by lying. But deception is a cognitive function that defies direct measurement. Indeed, throughout the

Much of the American public seems to be convinced that the "lie detector" is valid, as indicated by its ubiquitous use in "whodunit" literature and on television crime, psychology, talk, and news shows.



entire history of medical science, there have been no scientific studies that have shown that the emotional response linked to lying could be measured. Moreover, reactions associated with lying and any other assumed emotional stresses can be quite variable. Some people may stay calm with a gun at their head. By contrast, others may respond excessively with heart thumping and sweaty palms at simply shaking someone's hand. The polygraph examination itself often causes fear and anxiety, and if such responses are excessive in response to a given question, then one may be deemed to have failed that question by a polygraph examiner.

The Evidence

Because of this obvious biologic improbability in this era of evidence-based medical science, the premise of lie detection by polygraph has fallen under a cloud of skepticism, and it is justly considered pseudoscience by most of the scientific community (Iacono 2001).

The premise of lie detection by polygraph has fallen under a cloud of skepticism, and it is justly considered pseudoscience by most of the scientific community.

The American Polygraph Association (APA), a professional organization for polygraph examiners, predictably has complete faith in the accuracy of the test. They have licensing procedures in twenty-eight states and their own trade journal, *Polygraph*, in which they report scientifically questionable studies and provide anecdotes of the accuracy of their trade. The majority of these members complete a six-week to six-month post–high school training course in the art of polygraphy. They are not required to have formal training in medicine, psychology, physiology, or behavior—the very disciplines on which the testing is based. The majority of their members cater to the legal system upon which their economic livelihood depends, thus creating the background for a clear conflict of interest.

As expected, polygraph examiners will usually confidently state that the exam is highly accurate, around 95 percent. This implies that if 100 guilty suspects are given a polygraph exam, ninety-five of them will be detected through the test, meaning that only five of these 100 will be a false negative and not be detected by this method. On the other hand, they will state that if you are telling the truth, you have almost a 100 percent chance of being cleared by the test (Reid and Inbau 1977).

However, to be acceptable to modern scientific standards, the two characteristics that must be established are the *sensitivity* and *specificity* of this test: Sensitivity is that percentage of positive test results when lying is known to exist. Specificity is the percentage of negative results in the absence of prevarication. Under both scenarios, to establish the test's accuracy, the presence of both lying and honesty must be determined independently of the test procedure itself. True accuracy must also be derived from real-life conditions because, for obvious reasons, it cannot be derived from volunteers in laboratory settings that lack the emotional pressures of real suspicion. To accomplish this, a group without known prevarication is tested to assess the results. But absolute proof of honesty is evasive in such individuals, because even if lying is absent, the anxiety associated with the test may cause false positive test results, reducing test specificity, which is a major confounder.

But what about test results in those who are actually guilty? We have little knowledge of the frequency with which liars are judged to be truthful. Moreover, guilty subjects—and many others—can purposely control their reactions using what are called "countermeasures," sufficient to confuse the results enough to produce a "false negative." One outstanding example of a false negative was that of Aldrich Ames, who in 1995 had successfully passed five polygraphs during his long career in intelligence, and, despite this, he was subsequently arrested and convicted of spying.

After Sandia National Labs Senior Scientist Alan P. Zelicoff published a strong commentary in Skeptical Inquirer calling polygraphs "a dangerous ruse" (Zelicoff 2001), Ames himself wrote a remarkable letter to the editor from federal prison confirming Zelicoff's points, adding that polygraphs are indeed "junk science," "a superstition," and "a refuge from responsibility." "Like handing fate to the stars, entrails on the rock, bureaucrats can abandon their duties and responsibilities to junk scientists and interrogators masquerading as technicians," Ames wrote (Ames 2001). In 2003, another example was provided by Gary Ridgway, who eventually was found to be the Green River Killer, having murdered forty-nine women in the Seattle area. Ironically, Ridgway had passed a lie detector test in 1987, while another man—who was proved to be innocent—failed. Although such isolated examples are admittedly anecdotal, they raise suspicions that the test itself may be flawed and should be carefully scrutinized through critical scientific means that employ large numbers of tests, as described below.

The polygraph test was not subjected to modern scientific investigation until three decades ago (Saxe et. al 1983; Lykken 1981). Since then there have been several studies employing improved methodology. Despite the impossibility of achieving a completely satisfactory research design, these tests clearly refute the high accuracy previously claimed. These studies have appeared in reputable peer-reviewed journals (Horvath 1977). They generally report a sensitivity ranging around 76 percent. This means that out of 100 liars only seventy-six of them will be detected by the polygraph. But adding doubt about this apparent test sensitivity is the fact that establishing true "guilt" often cannot be dissociated from prior polygraph testing, which may have contributed to confessions and/or guilty verdicts in court, skewing the data toward a falsely high sensitivity value of the test. The testing examiner also may have prior suspicions about the honesty of the examinee, which can in turn cause bias in the test's interpretation and further skew the data.

The skill of the examiners also is associated with considerable variability of results, creating another major source of inaccuracy. Some smaller police departments with limited budgets may designate a police officer to be their department examiner instead of using an outside professional examiner. The designated testing officer may have little or no formal training, other than the limited training provided by the company selling the instrument to the police department. This can lead to situational bias based upon an officer's predisposition to believe most suspects are generally guilty. As a result, the officer may categorize an inconclusive result as untruthful. If the testing officer is aware of the circumstances of the individual being tested, and the weight and extent of the evidence indicating the individual being tested is the likely perpetrator of the crime, unbiased testing is virtually impossible. Officers are also generally trained to ask questions using phrasing that may cause someone to answer in a manner that may appear to be an admission of guilt. This type of questioning format would be inappropriate in a polygraph examination. For these various reasons given above, establishing true sensitivity of this test is therefore unlikely ever to be achieved, but the estimations above are likely overstated.

Even more damning—but unsurprising—is that studies report an average specificity of 52 percent, meaning that out of 100 people who are not lying, only fifty-two will be identified as telling the truth while forty-eight of these honest individuals will be branded as liars. These odds are similar to a coin toss, which would have a specificity of 50 percent. Other studies (Brett et al. 1986; Kleinmuntz and Szucko 1984; Lykken 1981) have shown even lower specificity values, indicating that "positive" test results are virtually useless. In 2003, the National Academy of Sciences, after a comprehensive review issued a report, *The Polygraph and Lie Detection* (National Academy of Sciences 2003), stating that the majority of polygraph research was "unreliable, unscientific and biased" and concluding that fifty-seven of approximately eighty research studies—upon which the American Polygraph Association relies—were significantly flawed. It concluded that, although the test performed better than chance in catching lies—far from perfect—perhaps most important, the test produced too many false positives.

If anything, there is perhaps one minor advantage to subjecting suspected felons to such testing (Lykken 1981; Lykken 1991): 25 to 50 percent of examinees will, under the intense psychological pressure of the exam, confess to the misdeed at hand, having been persuaded that they have been proven dishonest by "scientific" means. It is usual for the polygraph examiners to interrogate the subjects whom they believe have "failed" the test. Examiners may state that there is no way now to deny the objective guilt demonstrated by this "impartial" scientific device, and that the only available option is to confess, which they often do. But, while perhaps

effective, this in no way exonerates the test itself. Perhaps various forms of torture such as water boarding might be just as effective. And one might ask further how often this form of interrogation might lead innocent persons to falsely admit, out of fear or other threats, to some form of wrongdoing.

Justification for Continued Use?

For all these reasons, the continued use of polygraph lie detection has the potential to cause much harm to those many innocents who are falsely judged dishonest by its results. A single failure could conceivably ruin one's life. Since 1923, polygraph evidence has not been admissible in federal court cases because the test was deemed to lack scientific validity. Sadly, however, it is still used widely by the court systems of many states. Moreover, suspects are frequently "offered" this test prior to criminal proceedings, but if, for any reason, they decline to be tested, this refusal

alone may cause them to be presumed guilty. Conversely, if they consent to be tested, they are risking the commonly occurring false positive outcome, which in the view of many prosecutors and juries, supports a guilty verdict. Thus from the standpoint of the accused, he/she is caught in a catch 22 situation.

Even more regrettable is the attempted application of this test for pre-employment or security clearances. In this context, testing large groups with a low base rate of dishonesty will disclose a large number of false positive responses, as encompassed in the mathematical principles of Bayes theorem (Tavel 2012). Understanding these concepts, the American Medical Association's Council on Scientific Affairs (1986) recommended that the polygraph not be used in pre-employment screening and security clearance, with which I fully concur.

Actually, instruction on passing these tests is easily available on some Internet sites.

Adding clear restrictions to this testing, The Federal Employee Polygraph Protection Act, passed in 1988, virtually outlawed using polygraphs in connection with employment. That law covers all private employers in interstate commerce, which includes almost every private company that uses a computer, the U.S. mail, or a telephone system to send messages to someone in another state.

Under the Act, it is illegal for all private companies to:

1) Require, request, suggest, or cause any employee or job applicant to submit to a lie detector test;
2) Use, accept, refer to, or inquire about the results of any lie detector test conducted on an employee or job applicant;
3) Dismiss, discipline, discriminate against, or even threaten to take action against any employee or job applicant who refuses to take a lie detector test.

Federal applicants and employees are also generally protected from lie detector tests by civil service rules. Despite all these apparent safeguards, they often must submit to a polygraph examination in the quest of a coveted security clearance for federal employment or to retain such a job. The Employee Polygraph Protection Act allows polygraph tests to be used in connection with jobs in security and handling drugs, or in investigating a specific theft or other suspected crimes.

As a result, these examinations continue to be used by federal agencies such as the FBI, CIA, and National Security Agency, where they are commonplace in decisions concerning employment. Applicants might expect them as a form of initial screening even before they start working at the agency. They may also be required to take follow-up polygraph tests from time to time. Prior to a likely job offer, the polygraph test is often the last remaining hurdle. Under these circumstances, the need to pass can be a very nervous event for anyone—especially those who have not been subjected to a polygraph before, and of course, as explained, this can easily trigger a false positive response, resulting in an unjustified rejection. Thus use of such a test for this purpose is very difficult to defend.

Given the fallacies of such testing, one would assume that enterprising individuals would provide instruction to subjects on how to pass such a test (through "countermeasures"), thus leading to the conclusion—rightly or wrongly—that one is being truthful. Moreover, the prior administration of certain drugs to block the sympathetic nervous system could also be expected to impair test accuracy. Actually, instruction on passing these tests is easily available on some Internet sites. Therefore it is difficult to understand why anyone providing personal instruction to this end would actually be prosecuted as if this were a felony. This is exactly what occurred recently (Taylor 2013) when an Indiana man was accused of "threatening national security" by teaching government job applicants and others how to pass lie-detector tests. He was sentenced to eight months in prison after federal agents had targeted him in an undercover sting. At the time of this writing, at least one additional case is pending on similar grounds. Although legal intricacies extend beyond this discussion, this issue appears to threaten First Amendment rights. Moreover, that such instruction is even possible exposes the flaws of a procedure largely regarded as pseudoscience by the scientific community. To exemplify this point further, let us present an intriguing—although farcical—analogy: Suppose we discovered that, through coaching, one could teach persons how to transfer firearms past metal detectors at air terminals without triggering alarms? Such a revelation would logically cause one of two reactions by the supervising authorities: 1) Eliminate such a flawed test in favor of one that is accurate; or 2) Attempt to silence those coaching this "deception" with threatened legal penalties, including incarceration. The obvious answer to this question—number one—requires little thought. But with regard to polygraph testing, this answer has thus far not been chosen by our authorities, for they have exercised the second option. The mere fact that authorities have chosen to suppress information of this type might, in itself, be considered as a tacit admission that such testing is fatally flawed.

Conclusions

In summarizing its many pitfalls, Iacono (2001) concluded in an article titled "Forensic Lie Detection: Procedures without Scientific Basis," the following, which I paraphrase for clarity: Although this form of testing may be useful as an investigative aid and tool to induce confessions, it does not pass muster as a scientifically credible test. Its theory is based on naive, implausible assumptions about its accuracy. It is biased against innocent individuals and can be beaten simply by artificially augmenting responses to control questions. Although it is not possible to adequately assess the error rate of this test, both of these conclusions are supported by published research findings in the best social science journals.

Given such overwhelming evidence of inaccuracy as I have presented here, how can we, as a society, react to such a perversion of science? The logical solution is to completely abandon this method of testing. The most urgent necessity is the complete elimination of this testing in connection with employment. All remaining state and federal laws that allow use of the polygraph, in or outside of court settings, should be abandoned. Moreover, as long as it remains in use, there is simply no justification for prosecuting those who provide information about how to "pass" such a test.

Unfortunately, various state and national polygraph certifying and licensing organizations—whose livelihood depends upon their own continued existence—are well entrenched in our society. Their provision of services to most law enforcement agencies creates a symbiotic relationship that is difficult to overcome. Nevertheless, to eradicate this blight the scientific community, as well as others who understand these concepts, must educate the public and relentlessly urge the responsible authorities to discontinue the present unsatisfactory status quo. ■

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From Our Archives

These related articles appeared in previous issues of the Skeptical Inquirer.

"Energy Department Will End Most Polygraph Testing," Kendrick Frazier, January/February 2007.

"Exploring Controversies in the Art and Science of Polygraph Testing," John Ruscio, January/February 2005.

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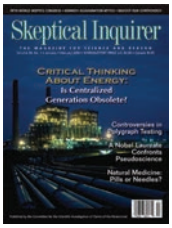

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Trends in Scientific Knowledge, Education, and Religion

Educational attainment in America has increased, and religiosity has decreased over the past two and a half decades, but knowledge of many standard scientific facts has changed relatively little, if at all.

CHARLES S. REICHARDT

Knowledge of elementary scientific facts is all too sparse among American adults. A quarter of Americans remain unaware of the fundamental Copernican reality that the Earth rotates around the sun (as opposed to the sun rotating around the Earth). Of those who have that most basic knowledge, a quarter don't know the Earth's circumnavigation takes a year (as opposed to a day or a month). A third of Americans believe that astrology is at least partly scientific. More than half don't accept the fact that humans evolved from earlier species of animals, and 59 percent don't believe the universe started with a big bang. Unfortunately, ignorance of many such scientific facts has not been substantially changing over the past few decades (also see National Science Board 2014; Frazier 2014).

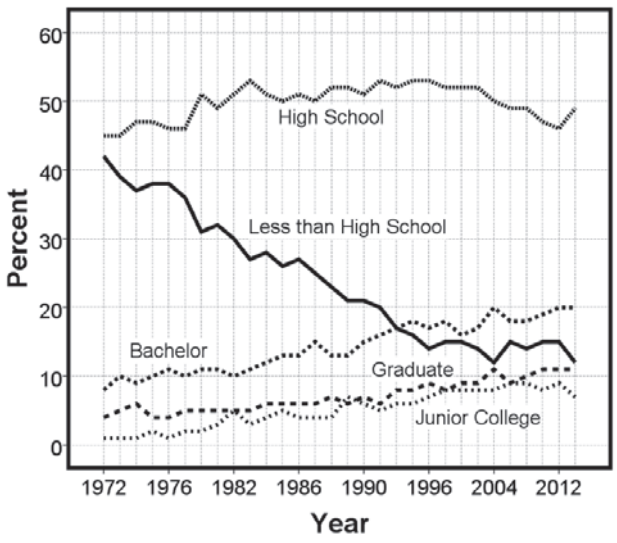
But while scientific knowledge has often changed at most only slowly, noticeable changes have taken place in educational attainment and religiosity. In particular, educational attainment has increased while traditional religious beliefs and practices have decreased.[1]

Trends in Educational Attainment

Competition for admission to prestigious colleges is much stiffer than it was decades ago. The reason is simple demographics; in 1972, 12 percent of the U.S. population twenty-five and older had finished college. By 2014, that percentage had risen to 31 percent, and the size of the U.S. population had increased by 50 percent. In contrast, the number of slots at prestigious colleges (unlike tuition) had not kept pace: hence there is substantially greater competition for college enrollment in recent years. The increase in educational attainment is shown, in greater detail, in Figure 1.[2] The solid line in that figure shows that the percentage of those who have less than a high school education plummeted from 42 percent in 1972 to 12 percent in 2014. Correspondingly, the percentage of adults who had graduate degrees tripled from 3.7 percent to 11.2 percent. The point is there have been substantial shifts toward higher educational degrees since the early 1970s.

Given the irregular trends in educational degrees exhibited in Figure 1, a reader might suspect that the average years of education in the United States has varied over time irregularly as well. But this is not so. Figure 2 displays the average years of education for American adults by calendar year. As the graph reveals, the increase in average years of

Figure 1: Distribution of educational attainment by year



education in the United States has been remarkably constant. The consistent upward trend is such that, over a ten-year span, the average level of education in the United States increased by a bit more than half a year.

Trends in Religious Affiliations and Practices

Religious affiliations have shifted substantially over the years. In 1972, 63 percent of American adults classified themselves as Protestants; by 2014 only 43 percent did. The percent of those who reported no religious affiliation rose from 5 percent of the adult population in 1972 to 21 percent in 2014. In contrast, the percent of Catholics and Jews have remained relatively stable (at about 25 percent and 2 percent respectively). Figure 3 displays these trends in religious affiliations.

Americans' beliefs about God have also shifted over the last few decades. For example, the percent who "know God really exists and have no doubts about it" declined from 63 percent in 1988 to 58 percent in 2014. Conversely, the percent who "don't believe in a personal God but . . . do believe in a Higher Power of some kind" increased over the same time period from 7 percent to 13 percent. And Americans have also attended religious services less frequently over the last four decades. In 1972, 9 percent of American adults said they never attended religious services. In 2014, that value had risen to 27 percent (cf. Hout and Smith 2015).

Relationship between Religion and Education

In general, there is a negative relationship between educational attainment and strength of religious beliefs: the more education Americans have, the less religious they tend to be. For example, in 2014, of those who believed the Bible is a book of fables, 37 percent had at least a bachelor's degree, while that figure was only 16 percent among those who believed the Bible is the word of God. Conversely, of those who believed the Bible is a book of fables, 55 percent had no more than a high school education in 2014 while that figure was 79 percent among those who believed the Bible is the word of God.

A similarly strong relationship exists between education and beliefs about God (rather than beliefs about the Bible). For example, in 2014, of those with less than a high school education 74 percent "know God really exists and have no doubts about it" while that percentage was only 47 percent among those who held a graduate degree.

Scientific Knowledge

The General Social Survey (GSS) asks ten true-false questions about basic facts in the physical and biological sciences. The GSS also asks a factual question about astrology that can be converted to a true/false dichotomy. Table 1 gives the wording of these eleven questions (including the average percent of correct answers to each question in 2014).

Figure 4 depicts the relationship between scientific knowledge and educational attainment (for data aggregated across the years from 2006 to 2014). The lines in the figure represent the percent of correct answers for the questions given in Table 1. That all the lines slope dramatically upward from left to right indicates that the percent

Figure 2: Average years of education by year

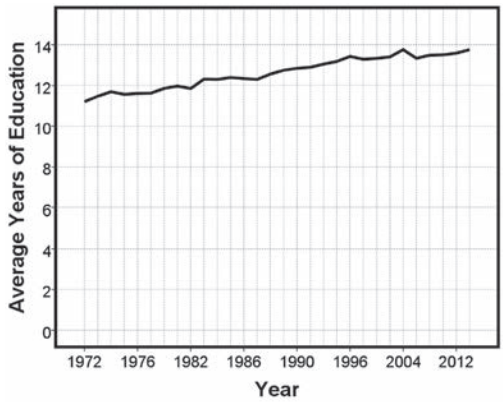


Figure 3: Distribution of religious affiliations by year

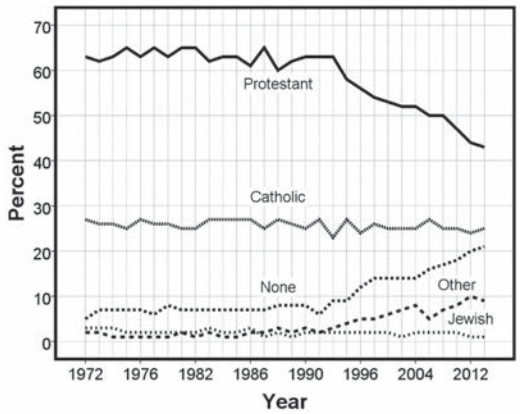


Figure 4: Percent of correct answers to eleven scientific questions by educational attainment

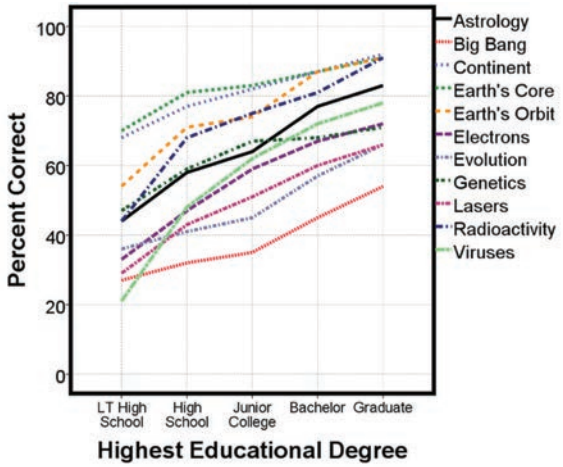


Figure 5: Percent of correct answers to eleven scientific questions by beliefs about the bible

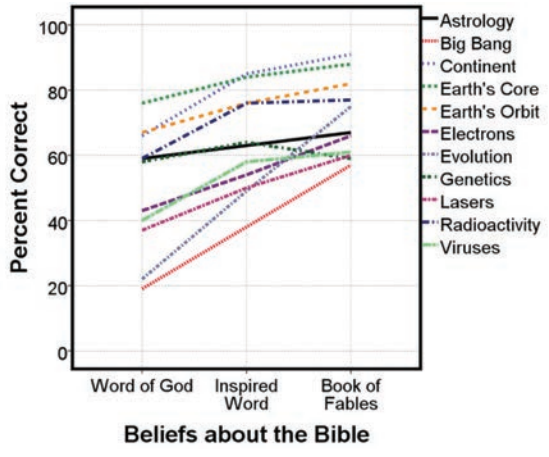


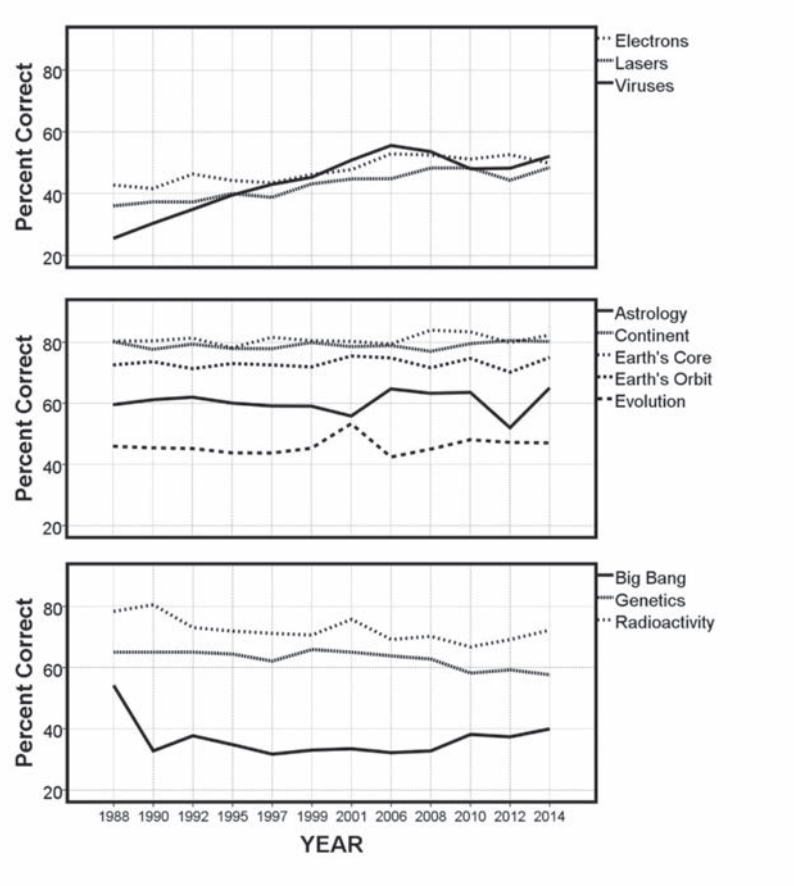
Table 1

Wording of Eleven Questions about Scientific Knowledge

Astrology: Would you say that astrology is very scientific, sort of scientific, or not at all scientific? (Not at all scientific)	[65%]	{0.9}
Big bang: The universe began with a huge explosion. (True)	[41%]	{-2.4}
Continents: The continents on which we live have been moving their locations for millions of years and will continue to move in the future. (True)	[81%]	{0.5}
Earth's core: The center of the Earth is very hot. (True)	[83%]	{1.1}
Earth's orbit: Does the Earth go around the Sun, or does the Sun go around the Earth? (The Earth goes around the Sun)	[75%]	{0.8}
Electrons: Electrons are smaller than atoms. (True)	[50%]	{4.5}
Evolution: Human beings, as we know them today, developed from earlier species of animals. (True)	[47%]	{0.8}
Genetics: It is the father's gene that decides whether the baby is a boy or a girl. (True)	[58%]	{-2.6}
Lasers: Lasers work by focusing sound waves. (False)	[49%]	{5.2}
Radioactivity: All radioactivity is man-made. (False)	[73%]	{-3.8}
Viruses: Antibiotics kill viruses as well as bacteria. (False)	[52%]	{10.7}

Notes: The correct answers to the questions are given in parentheses. The percent of correct answers to the questions in 2014 are given in brackets. The percentage point change per decade derived from a best fitting straight line, for data from 1988 to 2014, are given in braces.

Figure 6: Percent of correct answers to eleven scientific questions by year



of correct answers increases dramatically with educational degree. For example, 44 percent of those with less than a high school education know that astrology has no scientific basis, compared to 83 percent of those who have graduate degrees.

Figure 5 depicts the relationship between scientific knowledge and beliefs about the Bible (for data aggregated across the years from 2006 to 2014). Lines in the figure represent the percent of correct answers for different questions. That all the lines slope dramatically upward from left to right indicates that the percent of correct answers dramatically increases with decreasing religious convictions about the Bible. That is, moving from left to right along the horizontal axis means beliefs about the Bible change from 1 to 2 to 3 where these numbers represent the beliefs that the Bible is:

1. "The actual word of God and is to be taken literally, word for word";
2. "The inspired word of God but not everything in it should be taken literally, word for word";
3. "An ancient book of fables, legends, history, and moral precepts recorded by men."

For example, only 22 percent of those who believe the Bible is the word of God believed humans evolved from prior species of animals, but 75 percent of those who believe the Bible is a book of fables held that view. The largest increases occur for the questions about evolution and the big bang, where changes are 38 and 53 percentage points, respectively.

Trends in Scientific Knowledge

To review the findings discussed so far, educational attainment has been increasing in the United States (Figures 1 and 2) while religious beliefs and practices have been decreasing (Figure 3); scientific knowledge increases with increasing educational attainment (Figure 4) and with decreasing religiosity (Figure 5). Given these relationships, a thoughtful reader might conclude that scientific knowledge has been increasing over the years at an encouraging rate. However, such a conclusion would largely be wrong. Figure 6 presents the percent of correct

responses to each of the eleven science questions in Table 1 from 1988 to 2014.[3] The responses to three questions (on electrons, lasers, and viruses—shown in the top panel of Figure 6) have best-fitting straight lines with slopes of 4.5 percentage points or more per decade. For example, projecting the linear trend in electrons forward in time, the percent correct would go from 50 percent correct in 2014 to 54.5 percent correct in 2024.[4] The responses to five questions (astrology, continent, Earth's core, Earth's orbit, and evolution—shown in the middle panel in Figure 6) have best-fitting straight lines with slopes of 1.1 or less per decade.[5] And the responses to three questions (big bang, genetics, and radioactivity—shown in the bottom panel of Figure 6) have best-fitting straight lines with negative slopes of 2 percentage points or more per decade.[6] (However, straight-line fits don't do justice to all the trends, so a visual examination of the results in Figure 6 is worthwhile.)

Americans have become better educated and less religious. They have not, however, become much more knowledgeable about some basic scientific facts.

Note the percent of correct responses to the two questions (the big bang and evolution) most anathema to those who believe the Bible is the word of God (and, as noted above, the two questions that exhibit the greatest upward slopes in Figure 5) have not shown substantial increases in the past two decades. Also note that all the questions showing increases in the percent of correct responses greater than 4.5 percentage points per decade still have room for substantial further improvement. In particular, even though the responses to the questions about electrons, lasers, and viruses have upward slopes in Figure 6 greater than 4.5 percentage points per decade, the percent of correct responses to these questions were only 50 percent, 49 percent, and 52 percent in 2014.

Taken together these are not strong results for scientific knowledge. While answers to three questions show reasonable growth over the past two and a half decades, answers to five questions show essentially no growth, and answers to three questions show declines.

Americans have become better educated and less religious. They have not, however, become much more knowledgeable about some basic scientific facts.[7] Americans largely accept the fact that Earth has a hot core and that the continents are drifting apart (83 percent and 81 percent correct responses, respectively, in 2014). But less than half the adult population believes humans evolved from prior species and the universe started with a big bang (47 percent and 41 percent, respectively, in 2014). If past trends were projected forward, Americans would still have significant gaps in basic scientific knowledge for years to come. ■

Notes

1. Results are from the General Social Survey from 1972–2014 (GSS) and the National Science Foundation Survey of Public Attitudes Toward and Understanding of Science and Technology from 1979–2001 (SPATUST), which are representative samples of Americans eighteen years and older. Not all questions were asked each year, so data for different variables are available at different years.

2. Results in Figures 1 and 2 are for those twenty-five years and older, to allow for the completion of most levels of education. All other results are for those eighteen years and older.

3. Data from 1988 to 2001 are from the SPATUST, while data from 2006 to 2014 are from the GSS. In calculating the percent of correct responses, both "don't know" responses (which are substantial) and refusals to respond (which are small percentages) were counted as incorrect answers.

4. The percentage point change per decade from the best-fitting straight line is given, in Table 1, for each of the eleven scientific questions.

5. Data on the question about Astrology were collected back to 1979 (beyond the 1988 data in Figure 6) and earlier years had low values (e.g., 50 percent and 51 percent, respectively in 1979 and 1983, which were substantially lower than the average of the values, 60 percent, for the later years). Including these earlier data in the analysis would produce a linear slope of 2.7 percentage points per decade, even though the slope from 1988 to 2014 is essentially flat.

6. Data on the genetics variable were not collected in 1988 and 1990. The values entered in Figure 6 for those years are the value for 1992.

7. Relatedly, a pattern of "flat" results also arises in the ten-item vocabulary test the GSS has administered since 1974. The average total number of correct responses to that test is strongly related to educational attainment (varying, in 2014, from four to seven for those with a less than a high school education to those with graduate degrees, respectively). And as shown in Figure 2, education has been steadily increasing over the years. But performance on the vocabulary test has not increased from 1974 to 2014 (varying unsystematically within the narrow range of 5.8 to 6.2—starting at 5.99 in 1974 and ending at 5.98 in 2014).

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The Science of Meaning

Scientific research counters mainstream perspectives on meaning and purpose as coming only from God and illustrates how we can develop a science-informed personal sense of life meaning and purpose.

GLEB TSIPURSKY

According to the mainstream, traditional notions, science cannot answer life's big questions, such as how one can find meaning in life; that is the domain of religion. Using science to address life's meaning and purpose may seem surprising to many nonreligious people. However, there has been a wave of recent research in psychology, cognitive neuroscience, sociology, history, and other material as well as social science disciplines on life meaning and purpose. To be clear, the research does not provide a simple, clear, and straightforward answer to what life is all about. It does not answer the question "What is the meaning of life?" objectively. Instead, the research addresses how to gain a personal and rich sense of meaning and purpose in life and how to answer the question "What is the meaning of life for you?"

Thinkers on Meaning and Purpose

Faith-based, mainstream perspectives perceive the meaning and purpose of life to be found only in the divine. An example of a prominent recent religious thinker is Karl Barth, one of the most important Protestant thinkers of modern times. In his *The Epistle to the Romans* (Barth 1933), he calls modern people's attention to God in Christ, where the true meaning and purpose of life must be found. Another example is *The Purpose Driven Life*, a popular book written by Rick Warren (2002), a Christian mega church leader. His book powerfully shaped the public dialogue on life meaning and purpose.

Nevertheless, some thinkers disagree with the notion that religion is the only way to find meaning and purpose in life. Jean-Paul Sartre, in his *Existentialism and Human Emotions*, advanced the notions of "existentialism," the philosophical perspective that all meaning and purpose originates from the individual. The challenge for modern individuals, according to Sartre, is to face all the consequences of the discovery of the absence of God. He argues that people must learn to create for themselves meaning and purpose (Sartre 1957).

Another prominent thinker is Greg Epstein. In his *Good Without God: What a Billion Nonreligious People Do Believe*, he advocates striving for dignity as a means of finding "meaning to life beyond God." According to Epstein:

> We are not wicked, debased, helpless creatures waiting for a heavenly king or queen to bless us with strength, wisdom, and love. We have the potential for strength, wisdom, and love inside ourselves. But by ourselves we are not enough. We need to reach out beyond ourselves—to the world that surrounds us and sustains us, and most especially to other people. This is dignity. (Epstein 2009, 93)

Likewise, Sam Harris, in his book, *Waking Up: A Guide to Spirituality Without Religion*, states that:

> Separating spirituality from religion is a perfectly reasonable thing to do. It is to assert two important truths simultaneously: Our world is driven by dangerous religious doctrines that all educated people should condemn, and yet there is more to understanding the human condition than science and secular culture generally admit. (Harris 2014, 6)

Are they correct? Can we have meaning and purpose, which fall within the sphere that Harris refers to as spirituality and Epstein terms dignity, without belonging to a faith-based community?

Meaning and Purpose: Health Benefits

Before moving onward, I would like to establish the value of meaning and purpose. Research shows people who have a clear answer have better lives (Seligman 2002, 30–44). They can deal much better with both everyday life and the most challenging situations. The classic research on meaning and purpose comes from Victor Frankl, an Austrian psychiatrist who lived through the concentration camps of the Holocaust. He described how those who had a sense of meaning and purpose in their lives were most likely to survive and thrive in the camps. He conducted research demonstrating this both during and after his concentration camp experience (Frankl 1964, 101–36).

Recent studies illustrate that people who feel that their life has meaning and purpose experience a substantially higher degree of mental well-being. For example, Michael F. Steger, a psychologist and director of the Laboratory for the Study of Meaning and Quality of Life at Colorado State University, found that many people gain a great deal of psychological benefit from understanding what their lives are about and how they fit within the world around them. His research demonstrates that people who have a strong sense of meaning and purpose have greater mental well-being in general. They are more satisfied on a day-to-day basis, as well as at work (Steger et al. 2012). Adolescents, in another study, are shown to feel less depressed and anxious, and are less likely to engage in risky behaviors, the greater their search for and sense of meaning (Brassai et al. 2011).

Recent studies illustrate that people who feel that their life has meaning and purpose experience a substantially higher degree of mental well-being.

A deeper sense of life meaning and purpose also predicts better physical health. Greater meaning and purpose has been associated with a reduced risk of Alzheimer's disease (Boyle et al. 2010). An increased sense of life meaning and purpose correlates with reduced risk of heart attack, the leading cause of death in the United States, and stroke, another of the top-five leading causes of death (Kim et al.

2013a and 2013b). With such benefits for mental and physical well-being, it is no wonder that a strong sense of life meaning and purpose predicts longevity, whether in the United States or around the world (Boyle 2009).

Research on Life Meaning and Purpose

So now that the health and well-being value of a rich sense of meaning and purpose are established, we can proceed on determining how to gain this sense from a research-based perspective. First, it is vital to recognize that studies show that a strong sense of meaning and purpose correlates with strong religious belief. Research on the psychology of religion illustrates that "for many, the most salient core psychological function of religion is to provide a sense of meaning and purpose in life" (Batson and Stocks 2004, 149). Survey-based studies affirm such individually oriented psychological research. For example, a study of the population of Memphis, Tennessee, found that the extent to which religion has salience in a person's life correlates with a heightened sense of meaning and purpose (Petersen and Roy 1985, 49–62). Another study used the General Social Survey, which tracks demographic, behavioral, and attitudinal questions across the United States. The researcher investigated how the degree of belief in God relates to a personal sense of life purpose. The data showed that people who indicated they are confident in the existence of God self-report a higher sense of life purpose compared to those who believe but occasionally doubt, and to nonbelievers (Cranney 2013, 638–46).

Yet from a skeptical perspective, we need to be wary of any claims suggesting correlation implies causation. One of the most widely known examples of this problematic thinking error is the irrational belief that autism is caused by vaccination. The correlation between the fact that autism begins to appear in children at the same time in their life that they get vaccinated does not at all mean that vaccination causes autism (Godlee et al. 2011). Can the same problematic thinking error be plaguing the studies showing correlation between religion and life meaning?

It can and does. Studies indicate that to gain life meaning and purpose, and its consequent health and well-being benefits, one can pursue a number of paths, with religion being only one of those paths. Frankl's classic research suggests the crucial thing for individuals surviving and thriving is to develop a personal sense of individual purpose and confidence in a collective purpose for society itself, what he terms the "will-to-meaning and purpose." Frankl himself worked to help people find meaning and purpose in their lives. He did so by helping prisoners in concentration camps, and later patients in his private practice as a psychiatrist, to remember their joys, sorrows, sacrifices, and blessings, thereby bringing to mind the meaning and purposefulness of their lives as already lived. According to Frankl, meaning and purpose can be found in any situation within which people find themselves. He emphasizes the existential meaning and purposefulness of suffering and tragedy in life as testimonies to human courage and dignity, as exemplified both in the concentration camps and beyond. Frankl argues that not only is life charged with meaning and purpose, but this meaning and purpose implies responsibility, namely the responsibility upon oneself to discover meaning and purpose, both as an individual and as a member of a larger social collective (Frankl 1964, 101–36).

Studies indicate that to gain life meaning and purpose, and its consequent health and well-being benefits, one can pursue a number of paths, with religion being only one of those paths.

Frankl's approach to psychotherapy came to be called logotherapy, and it forms part of a broader therapeutic practice known as existential psychotherapy. This philosophically informed therapy stems from the notion that internal tensions and conflicts stem from one's confrontation with the challenges of the nature of life itself, and relate back to the notions brought up by Sartre and other existentialist philosophers. These challenges, according to Irvin Yalom in his *Existential Psychotherapy*, include: facing the reality and the responsibility of our freedom; dealing with the inevitability of death; the stress of individual isolation; and, finally, the difficulty of finding meaning in life (Yalom 1980, 6–10). These four issues correlate to what existential therapy holds as the four key dimensions of human existence—the physical, social, personal, and spiritual realms—based on extensive psychological research and therapy practice (Cooper 2003; Mathers 2001).

Science-Based Strategies for Gaining Life Meaning and Purpose

So why do studies show that a sense of life meaning and purpose correlates with religion? One reason is that so much of the research on this question has been conducted in the United States. And it just so happens that in the United States, religious communities have come to provide the kind of things that contribute to a sense of life meaning and purpose. Churches provide the main venue for Americans to reflect on their sense of meaning and purpose, by themselves

in prayer and together with others in bible study and other similar group activities.

However, correlation is not causation. Research shows that the important thing for our mental and physical health and well-being is simply to have a sense of meaning and purpose in life, regardless of the source of the purpose (Steger 2012, 381–85). What are research-based meaning-making activities that we can do without going to a church to gain life meaning and purpose? One way to do so is through intentional self-reflection. We can take the time to stop and think about our lives and experiences, to help us gain an individual sense of life's purpose and meaning through the lives we've already led. A great way to do so is through journaling, which has a variety of benefits beyond helping us gain a richer sense of life purpose. For example, a 2005 study found that writing about traumatic, stressful, or emotional events for fifteen to twenty minutes on three to five occasions has resulted in clear improvements in both mental and physical health (Baikie and Wilhelm 2005, 338–46). A 2014 study on journaling about previous life experiences for which we are grateful, in which participants were asked to keep daily gratitude diaries for three weeks, found significant psychological and physical improvements in people's lives (UC Davis 2014).

Here are some specific prompts to use in journaling about meaning and purpose in life, as informed by logotherapy:

1. What were important recent events in your life?
2. Which of them involved stresses and adversity, and how can you reframe them to have a better perspective on these events?
3. What did you learn from these events?
4. What are you grateful for in your life recently?
5. What was your experience of life meaning and purpose recently?

Consider journaling about these topics for a week, and see what kind of benefit you get, what kind of challenges you run into, and what you learned about how this journaling can be adopted to your own particular preferences and needs.

This and many other science-based strategies are described in my workbook, *Find Your Purpose Using Science*. Based on my own academic scholarship (Tsipursky 2012, 1–67) and that of others, the book combines academic research, an engaging narrative, and stories from people's everyday lives and provides a set of exercises you can do to help you figure out your own sense of meaning and purpose.

Believing in God and going to church are not the only ways to attain a strong sense of life purpose and meaning. You can gain it through personal self-reflection through journaling about your own sense of life purpose. You can also join venues that are secular, such as local chapters of the Center for Inquiry, and gain an opportunity for community ties and a chance to reflect on life purpose and meaning from a reason-based perspective together with other secular folks. Such activities, according to the scientific literature, are very likely to increase our sense of life meaning and purpose. ■

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Mistaken Memories of Vampires: Pseudohistories of the Chupacabra

As well-known monsters go, the chupacabra is of very recent vintage, first appearing in 1995. However, some writers have created pseudohistories and claimed a false antiquity for the Hispanic vampire beast. These examples provide a fascinating look at cryptozoological folklore in the making.

BENJAMIN RADFORD

Most people assume that the chupacabra, like its cryptozoological brethren Bigfoot and Nessie, dates back many decades or centuries. However, as discussed in my book *Tracking the Chupacabra: The Vampire Beast in Fact, Fiction, and Folklore* and in the pages of the Skeptical Inquirer, the origin of the mysterious vampire beast *el chupacabra* can be traced back to a Puerto Rican eyewitness who saw the 1995 film *Species*, which featured a nearly identical monster. Though both vampire legends and "mysterious" animal predation date back many centuries, there seems to be no evidence of any blood-sucking "chupacabra" before the 1990s.

The beast turned twenty last year, and its recent vintage poses a thorny problem for those who wish to claim it exists, because any evolutionary provenance for these unknown monsters is glaringly absent. Real animals don't simply appear out of nowhere; all animals are subject to the same evolutionary pressures and must have descended from earlier, equally known animals. The tree of life simply doesn't have a branch for the chupacabra, any more than it does for Bigfoot, Nessie, dragons, or the Jersey Devil.[1]

When forced to account for this conspicuous lack of historical record, proponents often co-opt native myths and legends of supernatural spirits, taking them out of context and mischaracterizing them as actual eyewitness accounts of encounters with unknown corporeal creatures. (For more on this process, see Daniel Loxton and Donald Prothero's *Abominable Science! Origins of the Yeti, Nessie, and Other Famous Cryptids*; and Michel Meurger's *Lake Monster Traditions: A Cross-Cultural Analysis*; as well as the book I coauthored with Joe Nickell, *Lake Monster Mysteries: Investigating the World's Most Elusive Creatures*.)

The chupacabra has two origin stories invoked to help explain its sudden appearance: the first is that the creature is an extraterrestrial brought here by visiting aliens; the second is that the chupacabra is an escaped entity created in a top-secret U.S. government genetics laboratory experiment gone wrong—essentially a classic conspiracy-laden *Frankenstein* scenario. Not coincidentally, these two origin stories are identical to those of Sil, a chupacabra-like monster in the film *Species* (see Figure 1 and Radford 2014).

The alien/Frankenstein's monster explanation, though embraced by many Puerto Ricans and others soon after the chupacabra's 1995 appearance, was unsatisfactory (and perhaps too outlandish) to some, who then offered their own histories of the vampire beast. A blank slate history creates an information vacuum easily filled by mystery-mongering speculation. (For analysis of historical chupacabra claims since the 1950s, see my SI columns "The Mystery of the Texas Chupacabra" in the March/April 2014 issue and "Texas Monsters and the Chupacabra" in the May/June 2015 issue.)

Chupacabra Lore Attributed to Early New Mexico

Because the chupacabra first appeared in Puerto Rico and for several years was mostly reported in Spanish-speaking countries, it's not surprising that Latin America would serve as a plausible setting for an origin story. In his book *Enchanted Legends and Lore of New Mexico*, Ray John De Aragon includes a fanciful tale titled "The Sheepherder and the Chupacabra," in which a shepherd named Francisco recounts a story:

> Dona Serafina, the old *curandera* [medicine woman] . . . said that many, many years ago, people were finding dead cattle, dead chickens, dead cibolos (bison), dead sheep, and goats and even a person who seemed like the blood had been drained out. Since whatever it was mainly attacked goats, she said—a goatsucker—the people called the mystery animal a chupacabra. Dona Serafina went on to tell them that ancient Indians had this strange breed of animal. She said that she herself had seen one with her own eyes following an Indian witch doctor who had it as a pet. "The chupacabra stopped and stared at me," she said. "It was an evil stare that sent a chill up and down my spine. But I was not going to show it that I was afraid. I just took out my detente, my picture with an embroidered edge that said [in English] The Sacred Heart of Jesus is with me. *Detentes* are to keep evil away from you and protect you. When the chupacabra saw the detente, it gave me a mad stare and followed its master, dragging its long skinny tail and turning to look back at me every now and then. I just held my detente out with my hand toward him. I don't go anywhere without my detente. You never know when you're going to see a chupacabra."

Some time after hearing this emotional story, while out on the plains tending sheep, Francisco encountered

> a strange creature . . . sniffing and giving the shepherd a mad stare. . . . It was a chupacabra, and it hungrily looked around at the scared sheep. Francisco took his detente out of his shirt pocket, and while holding it in his hand he recited the Lord's Prayer several times in succession. The chupacabra looked at him with its red eyes and growled fiercely, then turned and walked away. His *detente* had saved his life. (De Aragon 2012, 91–92)

Anyone familiar with folklore or the true story of the chupacabra—and I modestly count myself in both categories—will recognize that it has no basis whatsoever in fact or history. If it is indeed a "legend" of New Mexico, it's a new one fabricated in 2012 by De Aragon with no truth or historical provenance. It's a brand new story featuring a creature that first appeared in 1995, retroactively providing the beast with a fictional—and to many readers likely plausible—ancient heritage. The idea that a chupacabra was kept as a pet by a Native American witch doctor centuries ago is a novel twist, and the theme of a threatening demonic beast being scared off by the faithful who invoke Jesus is straight out of standard Catholic canon. (For more on the chupacabra being used as a symbol of Satan by religious authorities—primarily Pentecostals—see pages 53 to 55 in *Tracking the Chupacabra*.)

This fictional story, while making for an entertaining tale, runs the very real risk of being taken as a genuine historical legend by the book's readers. Though De Aragon clearly created the story, he implies that it is based on a legend told to him as true. Folklorists are careful to give references and citations for the stories they offer, to demonstrate both scholarly diligence and proper attribution, but these are unfortunately absent in De Aragon's book.

Even if De Aragon had heard some odd kernel of a demon vampire story that he embellished into his chupacabra tale, the details and facts he offers are so far removed from the original sources that any historical account of a real chupacabra encounter is hopelessly lost and garbled. Absent even a shred of corroborating evidence (for example, a written historical mention of the creature or even an independent "eyewitness" account of an encounter with one), it's safe to assume that this "legend" is wholly fictional.

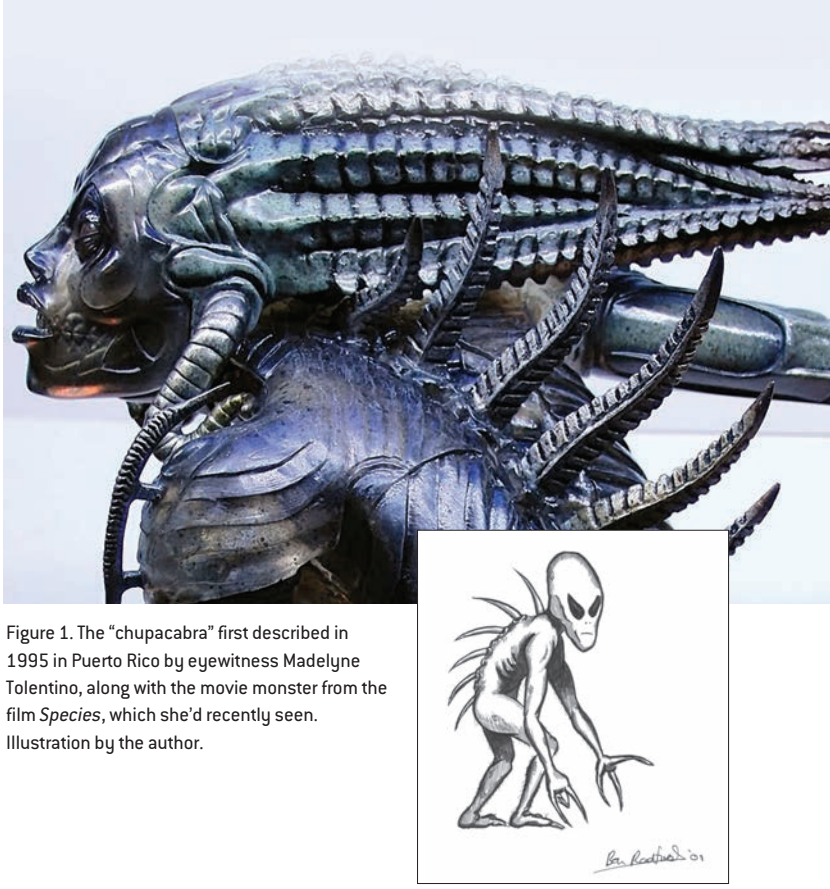

Figure 1. The "chupacabra" first described in 1995 in Puerto Rico by eyewitness Madelyne Tolentino, along with the movie monster from the film *Species*, which she'd recently seen. Illustration by the author.

The idea that a chupacabra was kept as a pet by a Native American witch doctor centuries ago is a novel twist.

Coronado, Zuni, and the Chupacabra

Another "legendary" claim to a natural history of the chupacabra comes from Bob Curran in his book *Vampires: A Field Guide to the Creatures That Stalk the Night*. He describes early explorer Francisco Vázquez de Coronado's encounter with the goatsucker (see Figure 2). In a chapter titled "El Chupacabra," Curran writes:

> A legend says that as he camped during the night, Coronado's livestock were attacked. It is told that some of his men drove off the attackers—described as small, dark, horny-skinned men—with torches and spears. In the morning, many of the cattle, which made up the main herd (1,500 animals), were dead, drained of blood. Despite this setback, Coronado was able to buy cattle from local Indians, replacing most of those that he'd lost, and press onward in

Figure 2. A garbled—and possibly nonexistent—legend suggests that conquistador Francisco Vázquez de Coronado encountered knife-wielding cannibal dwarves while exploring what is now New Mexico in the 1500s. Illustration by Celestia Ward.

> his quest. In the Zuni Indian pueblo at Hawikuh in Western New Mexico, he heard tales of strange grey men "with knives on their backs" who had sporadically fought with the Zunis in times long past. They could jump, the Zunis told him, and drop off their warriors from above, killing them with pointed sticks. It was said, the Zunis went on, that they drank blood. These tales were of little interest to Coronado, as his destination was the legendary Cibola, and all this talk of ferocious dwarves was only a distraction. (Curran 2005, 46)

There are many clues that this story—confused as it is—is not true. To his credit, Curran does offer several caveats about its veracity ("a legend says . . ." "it is told that . . ." etc.), and as with De Aragon's legend it's important to pay attention to this story's fifthhand provenance: Curran is describing what a legend says that Coronado claims about what he heard from Zuni Indians when they told him about what their forefathers told them they did a half-millennia ago.

I have no idea what, if anything, this alleged legend means, and Curran clearly doesn't either. Spanish conquistador Coronado was of course attacking and killing Zunis, not swapping friendly stories with them, and it's possible that the tribe told him the stories of the savage knife-spined dwarfs as an indirect warning to Coronado of the dangers his men faced in the area unless they moved along. Even if the legend is true—and there's no reason to think it is—there's also the problem that Spaniards and Indians didn't speak the same language; in fact, the two groups communicated largely through hand signals and rough interpretations.

In his book *Cities of Gold: A Journey Across the American Southwest in Pursuit of Coronado*, Douglas Preston (1992) describes several instances in which the meanings of words and messages got mangled and mistranslated between Coronado and Zunis (chickens were mistaken for turkeys and cattle for buffalo, for example). When communicating important messages from Coronado "it is unclear just how much of this the Zuni understood," Preston notes, which is not surprising since messages between the groups were "explained through signs" (285). Preston states that Coronado "asked the Indians to paint a cloth for him showing all the animals in the area, which they did" (304). It depicted buffalo, elk, coyotes, and other known animals—yet the chupacabra was conspicuously missing.

Thus we see that the dramatic, specific, and mysterious details offered in the legend are unlikely in the extreme.

A more serious problem is that—even assuming for the moment that details of the legend are true and that Coronado accurately understood and reported what he heard from the Zuni—there's no clear connection with the chupacabra. Chupacabra have appeared in various forms and been reported to have a disparate variety of features including wings, a tail, red eyes, and so on—none of the reports described "small, dark, horny-skinned men" or "strange grey men" or "ferocious [warrior] dwarves" armed with torches and spears. Even assuming the description has some basis in fact, the "knives" mentioned on the backs could simply describe where these mysterious "dwarves" sheathed their blades. The vampirism claim, though also superficially aligned with the chupacabra, is in fact unremarkable and standard lore universally used to demonize enemies (with echoes of the blood libel myths as well).

Curran offers another (even more confusing and improbable) version of this story in his book *American Vampires: Their True Bloody History from New York to California*. It concerns Coronado's expedition whose cattle were attacked one night.

> The attackers were "little gray men" with hard and spiky skins, which set upon the animals in order to draw their blood and consume some of their internal organs. They were only driven away by fire—the men held lighted torches to push them back. Local natives later told the Spaniards that these were chupacabras (goat suckers) and that they lived in the surrounding hills. They were cannibals who drank blood, and, if confronted they would attack humans as well as animals. It was said that they only came at night. . . . Locals told them that the beings . . . had lived there for a very long time, attacking their goats and cattle and sometimes themselves, and that there were some among them who could change shape, taking on the guise of a bird or coyote. (Curran 2013b, 190)[2]

Cannibals, of course, eat their own kind and therefore the "chupacabras" Curran describes would be neither extraterrestrial nor canid nor demon but instead *human*—an identification reinforced by the descriptions of them as "little men" using spears. But of course this "legend" is not internally consistent, as these "chupacabras" are also magical shape-shifting creatures.

Thus we see that the dramatic, specific, and mysterious details offered in the legend are unlikely in the extreme. Even if the Zuni did in fact try to describe some animal unknown to the invading Spaniards, who knows how garbled the description must have been (between Zuni hand signs and drawings translated into Spanish and later to English) to end up with something like "strange grey men with knives on their backs."

If this story is not made out of whole cloth, then its fabric content certainly approaches 100 percent. Again, despite the legend repeatedly invoking the label *chupacabra* to describe the mythical cannibalistic, vampiric, gray dwarves that Coronado is dubiously reported to have heard about, the connection to the chupacabra is virtually nonexistent. To clarify the question about the source—and therefore historical veracity—of this story I contacted Curran, who told me "I've used the Coronado story in a couple of books but I've no idea whether it's true or not."[3]

Ancient Alien and Pre-Atomic Age Chupacabras

Other pseudohistories of the chupacabra can be found in a sensational, special edition of the Spanish-language magazine *Contacto OVNI* (*UFO Contact*), which contains an article titled "El Chupacabras Hace 70 Anos" ("70 Years of the Chupacabra") and offered wild conjecture about the creature's origins, including a section titled "Chupacabras of the Pre-Atomic Era," which tries in vain to link the beast to a wholly unrelated 1925 news story about animal predation in Africa (Romero 1996).

In the archives of the Universidad Interamericana at Bayamon, Puerto Rico, I discovered another Spanish-language booklet, rather boldly titled *La Verdadera Historia del Chupacabras* (*The True History of Chupacabras*), which purports to reveal the true history of the beast. After beginning with long-since discredited accounts of the chupacabra by UFO researcher Jorge Martin, the ninety-six-page book—written under the name Redaccion Noticiosa (1996)—suggests that the Taino Indians (an Arawak-related group who inhabited many Caribbean islands when Columbus reached the Americas) knew of the chupacabra. It notes that "figures of beasts are prominent in the mythology and artifacts found in the Taina culture" (translation mine); and "We here at *Redaccion Noticiosa* believe that the presence of the chupacabra dates back to the pre-Conquest days when the Tainos ruled the island."

The booklet goes on to theorize that the Tainos' reverence for the El Yunque rainforest and the deities they believed existed there (claimed by some to be the home of the original chupacabra) allowed the animal to thrive there. Nonetheless, the Tainos would apparently hunt—and sometimes eat—the chupacabra, as depicted in a fantastic drawing illustrating a stereotypical scene of an armed Taino man watching a woman preparing food next to a chupacabra being roasted on a spit over an open fire (see Figure 3).

Perhaps the most outlandish fictional origin story for the chupacabra presented as speculative fact comes from writer Scott Corrales, contributing a chapter on the beast to a book of conspiracy theories. In it he quotes a Chilean researcher named Ferrer who was told by an elderly man that

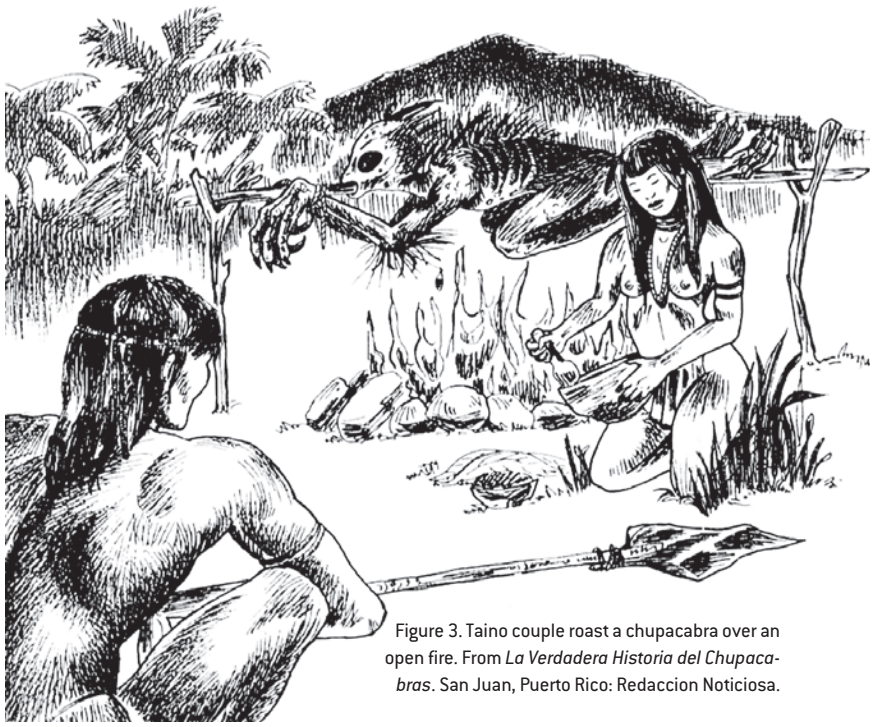

Figure 3. Taino couple roast a chupacabra over an open fire. From *La Verdadera Historia del Chupacabras*. San Juan, Puerto Rico: Redaccion Noticiosa.

"'his grandfather's grandfathers' were well aware that these predators [chupacabras] existed and that they were, in fact, gods who came to leave messages. In the past, these messages were articulated as complete sentences, but now they were numerical in nature . . . 666—the mark of the beast" (Corrales 2004, 127). Corrales gives free rein to this fact-free speculation and conjecture, concluding by asking ominously, "Who or what are these strange deities feared and worshipped by the ancient Atacamans [people from Atacama, Chile]? . . . . What would occur if the Atacamans neglected to perform the [blood sacrifice] ritual? Did their deities send monstrous minions [i.e., chupacabra] to collect the blood they needed?" (Corrales 2004).

Rumor, urban legends, and folklore are not fixed but instead are constantly changing.

Conclusion

I've discovered several examples of fabricated pseudohistories of the chupacabra, ranging from Zuni medicine man pet to vampiric minions sent by Mesoamerican deities to spear-wielding cannibal shape-shifting dwarves. I don't begrudge authors their speculative historical fiction—Curran and De Aragon are fine storytellers who offer vivid, engaging stories based on myths and legends—but one false explanation is as good as any other absent references or documentation.

The true history of the chupacabra is a fascinating and improbable story in its own right, full of conspiracy theories, vampire lore, and media hype. Presenting fabricated stories as "legends" only serves to blur the lines between fact and fiction—lines that researchers such as myself have worked hard to clarify (for years I have had a standing, unclaimed $1,000 reward for any verifiable, published pre-1990s reference to a vampiric *chupacabra* anywhere in the world).

The gradual expansion of what is popularly called a "chupacabra" is common; in my book I describe how the word originally referred to a very specific alien-type creature in the mid-1990s but had expanded to include hairless canids by 2000, and by 2010 virtually any animal not immediately identifiable was dubbed (either informally or by the news media) as a chupacabra. This same phenomenon has occurred in the literature as well, with stories under the name "chupacabra" retroactively applied to legends and rumors that historical figures claimed to have heard about some strange encounter. Since the references here predate the publication of my research, it's too soon to tell what effect, if any, it will have in correcting the record.

The migration of narrative themes seen in these and other pseudohistories of the chupacabra is to be expected. Rumor, urban legends, and folklore are not fixed but instead are constantly changing. As the researcher who first identified the origin of the chupacabra, I can lament the confounding stories that have emerged around this Hispanic vampire beast. However, the forces of folklore cannot be stopped, and trying to correct the record is a Canutian task. Folklore has a life of its own, and the best I can do is explain the true origin of the chupacabra back as far as I can and help document the monster's spread in pop culture. The information is there for those who wish to look, but I know better than most that the truth never stands in the way of a good story. ■

Notes

1. There have, of course, been various attempts to place mythical creatures within an evolutionary framework. For a fascinating look at taxonomical attempts to find a place for fairies, water spirits, and angels in a Darwinian worldview, for example, see Charles W. Leadbeater's 1913 book *The Hidden Side of Things*.

2. It's not clear in this legend why animals that look and act exactly like coyotes—which are well known to attack livestock, including goats and cattle—were assumed by locals to not be coyotes at all but instead chupacabras that had cleverly changed into coyote form before attacking the livestock. This seems rather like assuming that a pet dog that soiled the floor must have really been an unknown shape-shifting animal at the time—instead of the dog it obviously was—because a beloved pet wouldn't do that.

3. Curran told me: "According to my notes it comes from a book which I was shown in the Biblioteca National in Barcelona a good number of years ago. The book is *Las Adventuras del Gran General Francesco de Coronado, Explorador y Goberndor de Nueva Galicia y Otres en America* and the date I have for it is 1895. For some reason I don't have the author but it is published in Madrid or so my notes say. It is in Catalan Spanish (I think that it's Catalan) but I got a friend to translate some portions for me" (Curran 2013a).

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Deepak Chopra's 'Physics'

It Starts with a Swindle

Deepak Chopra attempts to connect fundamental concepts of physics to consciousness and spirituality. He started (ab)using physics with his book *Quantum Healing*. But does he pass the first test of a true scientist: professional integrity?

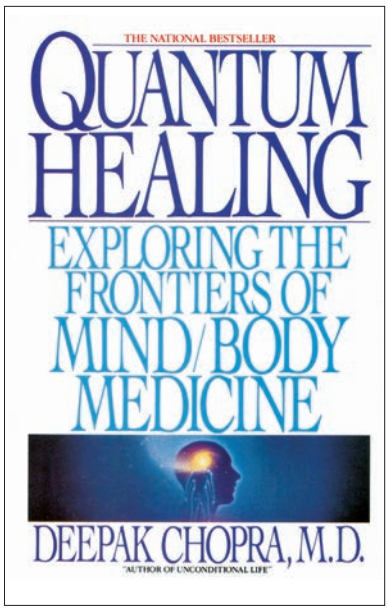
SADRI HASSANI

Crackpot scientists are very fond of abusing and trivializing science—especially physics—and particularly fundamental physics. It is therefore critical to fight crackpot science where it hurts the most: at the fundamental level. While there is much critique of the promoters of pseudoscience and their ideas are debunked at the *factual* level, few profound analyses of the fallacy of the way they misuse fundamental science are available. My purpose in this article is to help fill this gap.

One of the early trivializers of fundamental physics is Deepak Chopra, whose indiscriminate use of words such as *quantum*, *energy*, *field*, and *non-locality* renders them as frivolous as a burp after a course of tandoori chicken. Accordingly, it is worthwhile to examine his "physics" and unravel the egregious conceptual blunders he incessantly concocts, especially when these blunders serve as the foundation for the conclusions that he touts as scientific facts to his readers and followers.

The Book

Chopra came to prominence by publishing *Quantum Healing*, a trend-setting book on mind/body medicine in which he beguiles his readers into believing that Ayurveda, the traditional Indian medicine, has a scientific basis. His mission ever since has been to tout the message that the universe is conscious, that consciousness creates and governs matter, *and that modern physics is at the heart of this message*. The pernicious tactic that he uses for this purpose is to decorate his speeches and writings with the names of famous physicists such as Einstein, Planck, Schrödinger, and Heisenberg and to attribute his own ideas about mind and matter to them.[1]



Since *Quantum Healing* initiated the fashionable trivialization of one of the greatest scientific and intellectual achievements of mankind, it is instructive to present for the layperson a rigorous scientific evaluation of that book's content. But first we have to evaluate the professional integrity of the author. After all, the primary premise of science is honesty. Stanley Pons and Martin Fleischmann were credible scientists before their hasty announcement of the discovery of cold fusion in March 1989, after which they fell out of grace in the scientific community (Huizenga 1992). Does *Quantum Healing* stand the test of scientific honesty?

The book's title heralds a revolutionary idea that demands a level of intellectual integrity from the author equal to that of other revolutionary scientists. This integrity is, in part, exhibited by the way scientists usually acknowledge individuals who had a role in shaping the ideas expressed in the work. Einstein, in his article on the groundbreaking special theory of relativity, acknowledges Michele Besso, an obscure friend of Einstein's who worked at the Bern's patent office at the same time that Einstein did (Einstein 1952). In a separate account of how special relativity was born, Einstein elaborates on the conversations he had with Besso and how those con-

versations helped consolidate his idea of the relativity of time (Hassani 2010, 362). Similarly, Planck's two seminal papers that originated quantum theory contain numerous mentions of the physicists who helped him shape the quantum idea. His gratitude is especially manifest in his Nobel Lecture in which he attributes his discovery of the electromagnetic quanta to Ludwig Boltzmann, the creator of statistical mechanics, by declaring ". . . this problem led me automatically to a consideration of . . . Boltzmann's trend of ideas; until after some weeks of the most strenuous work of my life, light came into the darkness, and a new undreamed-of perspective opened up before me" (Planck 1918).

Such acknowledgements of the discoverers of scientific ideas are not only a sign of honesty but also a reminder that science is a collective enterprise encompassing not just the invention of a single person but the collaboration of a community that stretches across the globe and extends into the past and future. In order to contribute to science, one first has to learn the relevant contributions made to it by other scientists; one can see further only "by standing upon the shoulders of giants," and any "new kind of science" that undermines—or even disagrees with—the well-established and empirically tested ideas without presenting good evidence to the contrary can only be the invention of a crackpot.

Chopra ought to be held to as strict an integrity standard as the scientists he is so fond of mentioning in his speeches and writings. This is so not only because he is writing about (his distorted version of) science, but also because he commands millions of followers who *literally* regard him as a prophet. His words, fogged by a plume of terminology stolen from science—a discipline revered and trusted, albeit misunderstood, by the public—are powerful maxims and mottos for his disciples.

The Swindle: The Disappearance of Maharishi

An intellectually honest author of a nonfiction work writes a second edition only when there are substantial changes in the content of the work, usually several years after the original edition. These changes, and the reason and purpose behind them, are clearly stated in the preface of the new edition, while the preface of the earlier edition is also kept in the book for comparison. The hardcover edition of *Quantum Healing* came out in 1989 and its paperback edition in 1990. In the Introduction, Chopra narrates his meetings with "one of the greatest living sages," who imparted to him some ancient techniques that "would restore the mind's healing abilities" (Chopra 1989, 2–4; also available online at http://skepticaleducator.org/wp-content/uploads/2015/03/IntroToFirstEd.pdf). In one of the meetings, the sage tells Chopra:

> I have been waiting a long time to bring out some special techniques. I believe they will become the medicine of the future. They were known in the distant past but were lost in the confusion of time; now I want you to learn them, and at the same time I want you to explain, clearly and scientifically, how they work.[2]

From his words, one gets the unmistakable impression that, were it not for his contacts with this great sage, Chopra would not have come across the "discovery" described in his book. In fact, he feels so much indebted to the sage that he dedicates the book "With a full heart and deepest thanks to Maharishi Mahesh Yogi" (Chopra 1989; also available online at http://skepticaleducator.org/wp-content/uploads/2015/03/Dedication.pdf). As Maharishi's influence on Chopra's "discovery" is evident throughout the book, one might think that, like an honest scientist, Chopra is acknowledging the conversations he had with the sage and how those conversations might have helped shape his ideas. However, that would be premature thinking, because the acknowledgement appears only in the *printings* of the book up to the fourteenth.

The sixteenth and subsequent printings[3] *seem to be* the "second edition," because they contain a single page titled "Preface to the New Edition." However, the usual practice of imprinting "Second Edition" on the cover is foregone. Furthermore, unlike any ordinary new editions, *no preface to the first edition* is retained in the new edition. So, why write a preface to the "new edition?" A conspicuous change in the new edition is that all citations of Maharishi's name are erased; the meetings with him, which were the starting point of quantum healing, are not mentioned at all; the crucial "primordial sound" techniques, which were "the strongest healing therapies in Ayurveda" and were prescribed for incurable diseases such as cancer, are gone; there is no mention of the revelation of "some great secret" that took place after meeting with Maha-

rishi; no mention of how Maharishi taught Chopra "how to pierce the mask of matter." Therefore, the new preface is most likely a smokescreen for Chopra's deletion of the name of the person who implanted the idea of the book in his mind.

This deletion is shamelessly manifest in the bibliographies of the two "editions." In the bibliography of the earlier printings of the book, Chopra writes "I enthusiastically recommend the following eleven books, all of which entered into my own education on these fascinating subjects" (Chopra 1989; also available online at http://skepticaleducator.org/wp-content/uploads/2015/03/Biblio1.pdf). Two of those eleven books are by Maharishi. In the bibliography of the sixteenth and later printings, he also recommends *eleven* books, *but he lists only nine*![4] You can guess which two are missing. In an act that should make both Chopra and his publisher ashamed of themselves, and in a frenzied rush that can be ascribed only to charlatans and fraudsters who want to hide the evidence, Chopra erased all traces of Maharishi's name and the guru's influence on *Quantum Healing*, but he forgot to count the number of the remaining books in its bibliography.

Does the "second edition" contain substantial changes in the content of the book? Although Chopra mentions the change in *his* views in the preface of the new edition, he doesn't say how the change affected its *content*. In fact, if you compare the pages of the first and second editions, as I did, you'll see practically no change in the content except for the removal of any reference to Maharishi. What makes all of this suspicious is that there is absolutely no explanation for any of these changes in the book itself.

The Blunder: 'Explanation' after Maharishi's Death

As a regular contributor to *The Huffington Post*, Chopra hurriedly wrote an article on February 13, 2008[5] (available online at http://www.huffingtonpost.com/deepak-chopra/the-maharishi-years-the-u_b_86412.html). It is important to examine the highlights of this article, as it narrates Chopra's tumultuous relationship with Maharishi, especially because the article is filled with numerous accounts of intimate encounters of the two, containing outlandish claims that often resemble miracles.

In the bibliography of the sixteenth and later printings, he also recommends *eleven* books, *but he lists only nine!* You can guess which two are missing.

Chopra begins the article with reporting the publication of his book, *Perfect Health*, in 1991, at least six years after he met Maharishi. He does not mention his earlier book, *Quantum Healing*, by far his most influential book, the germ of the idea of which was planted in his mind after several meetings with the guru. He completely ignores that in 1985, right after his meetings with Maharishi, he quit his job at the New England Memorial Hospital to establish the Maharishi Ayurveda Health Center in Boston (https://en.wikipedia.org/wiki/Deepak_Chopra). He forgoes the fact that it was in this Center that his ideas for writing *Quantum Healing* took shape (Chopra 1989). He does not explain why he changed the name of the center to Ayurveda Health Center in the later printings of the book.

Chopra continues: "When I was in meditation I had a vision of Maharishi lying in a hospital bed with intravenous tubes in his body breathing on a respirator." He immediately takes a chartered airplane from Chicago to Delhi only to find Maharishi exactly as he saw him in his vision. Because of the seriousness of Maharishi's condition, it was decided that he should be flown to London. Chopra flies to London and makes arrangements for Maharishi to be admitted to a private hospital. As he was standing outside the hospital, watching an ambulance navigate the snarled traffic, one of the accompanying doctors ran up with the news that Maharishi had suddenly died. Chopra rushes to the ambulance, "picking Maharishi's body up and carrying him in my arms through London traffic." However, after twenty-four to thirty-six hours the attending informed them that Maharishi was recovering miraculously.

But the recovery was somewhat slow. "There was a point where the doctor informed us that [Maharishi] had severe anemia and needed a blood transfusion. When they typed and cross-matched Maharishi's blood, I turned out to be the only match." After the hospital, Maharishi was moved to a country home in the southwest of England where "I spent hours personally nursing him." In all, Maharishi was out of circulation for almost a year; few in the Transcendental Meditation movement knew where he was. After he was fully recovered, he was flown via helicopter to the small village of Vlodrop in Holland.

It is not clear who decided to move Maharishi out of sight. What is clear is that he remained in Vlodrop while Chopra "was sent, as one of his main emissaries, on a routine of almost constant jet travel. . . . Everywhere I went I was given the respect accorded to my guru, bringing with it a level of pomp and ceremony that verged on veneration." In July 1993, Chopra went to see Maharishi in his private rooms to pay "his respects," at which time Maharishi said, "People are telling me that you are competing with me. . . . I want you to stop traveling and live here at the ashram with me." He also

wanted Chopra to stop writing books. After delivering what amounted to an ultimatum, "I was given twenty-four hours to make up my mind."

Could Chopra's actions be anything but an intention to smear the facts?

February 13, 2008, when the article appeared in the *Huffington Post*, was *just eight days* after Maharishi's death and more than *fourteen years* after Chopra broke up with him some time in the second half of 1993. Chopra must have had the article ready when Maharishi was still on his deathbed. What reason could one have to wait over fourteen years to tell such a self-praising, intimate story of a relationship between oneself and another person, and then publish the story right after the death of the latter? Could it be anything but an intention to smear the facts?

Any intelligent reader who is not mesmerized by Chopra's insidious charm can see in the *Huffington Post* article the power struggle between an old guru and a conniving disciple who is trying to steal the guru's congregation for personal gain. The reader can also detect Chopra's egregious attempt at portraying himself as a superhuman being with a miraculous power of healing who can see events that are happening thousands of miles away. A follower, on the other hand, believes every word of the narrative and spreads the story to other potential followers. This is the audience for whom Chopra wrote the article. And this is the audience who should be made aware of his professional dishonesty.

Chopra's removal of all references to Maharishi in the later printings of *Quantum Healing*—regardless of any personal conflict he may have had with the guru—reveals his lack of professional integrity, as by his own admission in the earlier printings, it was his numerous meetings with Maharishi that inspired him "to explain, clearly and scientifically, how [the Ayurveda techniques] work." And his explanation of the conflict, hurriedly published in the *Huffington Post* right after Maharishi's death, is a telltale sign of professional hypocrisy at its worse.

Paraphrasing a famous quote by the late Carl Sagan, extraordinary book titles require extraordinary professionalism. This article has documented sufficient evidence to demonstrate that Deepak Chopra's professionalism in the writing of *Quantum Healing* is of such a low quality that it borders on charlatanism. ■

Notes

1. In the keynote lecture (https://www.youtube.com/watch?v=o-ijyqWzDrY&feature=kp) that Chopra delivered in a meeting arranged by Salesforce in 2013, he repeatedly mentions the names of various famous scientists including Newton, Einstein, Planck, etc., to convince his audience that dark energy and dark matter are not only unknown but also "unknowable" and that scientists should not try to uncover the truth. The clip at https://youtu.be/dA89wWI6ljo compares Chopra's message with another poet/prophet who also advised against seeking truth and was instrumental in paving the way for the Dark Ages.

2. The sage seems to have it backward. A technique that is in any way related to science comes *after* the prerequisite scientific knowledge has been gained. One doesn't start with a technique and *then* ask for (or order) a scientific explanation. It is like the pope asking a devout Catholic scientist to find a scientific basis for the Hail Mary!

3. I haven't seen the fifteenth printing, so I don't know if Maharishi's name is present there or not.

4. Because the "second edition" of *Quantum Healing* is only a fake, the dates appearing on the copyright page refer to the first "edition," namely 1989 for the hardcover and 1990 for the trade edition. It is therefore hard to reference the "second edition"—which presumably appeared in 1993 or 1994 after Chopra broke up with the guru—in the proper normal way. Only by looking at the printing number on the copyright page can one anticipate whether or not the book contains Maharishi's name. As of the thirty-fourth printing that I purchased in 2013, Chopra has not corrected the bibliography: he still recommends eleven books and lists only nine! This bibliography can be found online at http://skepticaleducator.org/wp-content/uploads/2015/03/Chopras-bibliography.pdf.

5. The date of the post has changed at least once since I first discovered it on July 2, 2011. On March 18, 2015, the date was changed to 12/31/1969 7:00 PM EST and the post appeared to have been updated on 11/17/2011! (Copy available online at http://skepticaleducator.org/wp-content/uploads/2015/03/Deepak-Chopra-The-Maharishi-Years-The-Untold-Story-Recollections-of-a-Former-Disciple-.pdf.) As I understand it, 12/31/1969 7:00 PM EST is the epoch time of some platforms, and is the default to which the system reverts whenever the date/time of a file is entered incorrectly. One occasion on which this could occur is when one tinkers with an existing date/time. I have kept a copy of the post as it appeared on July 2, 2011, showing its original date and time of publication, just in case the date changes again (copy available online at http://skepticaleducator.org/wp-content/uploads/2015/03/Deepak-Chopra_-The-Maharishi-Years-The-Untold-Story_-Recollections-of-a-Former-Disciple.pdf).

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Lincoln's 'Haunting' Presence

JOE NICKELL

Ghosts of Lincoln: Discovering His Paranormal Legacy. By Adam Selzer. Woodbury, MN: Llewellyn Worldwide, 2015. ISBN: 978-0-7387-4153-6. 330 pp. Paperback, $15.99.

Adam Selzer's *Ghosts of Lincoln: Discovering His Paranormal Legacy* is a roundup of anecdotes and claims about the great president's involvement in spiritualism, his paranormal experiences, sightings of his ghost and others, and other supernatural claims. It is published by Llewellyn, a purveyor of uncritical books on paranormal topics—that is, books aimed to sell. Typical of Llewellyn's offerings is one I reviewed in a recent blog, an example of the genre I call "Haunting Hokum." In it, the author uses such non-attribution phrases as "it is believed that" at least 111 times! (See Joe Nickell, 2015, "It Is said That . . .," *Investigative Briefs* blog, July 13. Available at www.centerforinquiry.net.)

However, *Ghosts of Lincoln* is a cut above—so much so that I wonder how it slipped by Llewellyn's cynical editors. The answer seems to be that they could overlook the author's frequent skeptical observations (and extensive footnotes), as long as he didn't go too far. As the erstwhile ghost tour guide asserts, "It's never my intention to prove or debunk a ghost story" (11).

In some cases, Selzer's attempted investigations fail. For example, he repeats the famous tale of Lincoln having once looked at a mirror in his home in Springfield, Illinois, where he saw a startling double image of his face. The story having been published after Lincoln's assassination, the "vision"—which Lincoln himself saw as a curious "illusion"—has often been interpreted as an omen of his death. To his credit, Selzer attempted to locate the mirror at the historic Lincoln home (something I had tried some seventeen years before), but much of the furniture had been dispersed long ago. He did take a mirror to the site in hopes of learning something, but he could never reproduce the effect there or elsewhere.

Selzer did take a mirror to the site in hopes of learning something, but he could never reproduce the effect there or elsewhere.

Had he checked, he would have discovered that in 1998 I had reproduced the effect using an antique mirror like Lincoln had described (a swinging one atop a bureau). When light naturally reflects off of both the front of a mirror's glass and the silvering on the back, the effect is insignificant in the case of modern glass, but the unevenness of old glass can produce a distinct double image, as in my successful demonstration. (See my experimental photograph in Joe Nickell, 1999, "Paranormal Lincoln," Skeptical Inquirer 23[3] [May/June]: 16–19.)

Selzer does somewhat better in another case, that of the whopping tale of "Lincoln riding a flying piano"—or rather *tales*, because there are many differing versions. (Folklorists call them *variants* and they are evidence of the folklore process at work.) Selzer says the account, "of Lincoln riding on a piano as it levitated up and down from the floor, is a part of Lincoln folklore and is backed up by at least one supposed witness . . ." (100). Usually the "piano ride" is reported to have occurred at the home of spiritualists Cranston and Margaret Laurie, whose daughter Belle was the supposed medium.

Most of the sources are heavily biased, some tracing back to Belle's own family members. Another source was a spiritualist named Simon P. Kase whose story kept changing. One ver-

sion roughly matches that of medium Nettie Colburn who (in her 1891 book *Was Abraham Lincoln a Spiritualist?: Or, Curious Revelation From the Life of a Trance Medium*) claimed to have given séances for Lincoln in December 1862 and February 5, 1863, the latter having included the piano-riding incident. Actually, a letter written to Lincoln by his friend Joshua F. Speed, introducing to him Miss Nettie Colburn and another lady, bears the date of October 26, 1863—*more than eight months after Colburn claimed to be on close terms with the president*.

Selzer acknowledges that the letter "pretty well obliterates" Nettie Colburn's claims. He even gives an account by General Daniel Sickles of an event that might have been the origin of the Lincoln-and-piano incident. Sickles wrote that the Lincolns did attend a séance during which a medium caused a piano to "dance up and down to the music." Following her, however, Sickles says Lincoln went to the little piano and sat down. He couldn't play a note, but the piano nevertheless danced, amazing attendees, until Lincoln showed he was simply using his knees to rock it.

Nevertheless, Selzer sums up by saying, infuriatingly, that "we can't necessarily say that Lincoln's piano ride didn't happen." He adds that "though the details get too jumbled to say anything with certainty, all of the conditions are right"—i.e., the Lincolns attended séances where sometimes pianos were reportedly seen to float (137). This kind of authorial contortion—to try to salvage a claim from utter debunking—is a thing to behold.

Selzer devotes a chapter to spiritualists' attempts to contact the assassinated president's spirit, but concedes—necessarily—that most of the séances on record "seem to have been patently the work of charlatans, which doesn't necessarily make them less interesting to read about today" (231). He repeats Houdini's story about how, as the boy Erich Weiss, age sixteen, he had challenged the alleged spirit of Lincoln that was speaking through a medium. Young Weiss asked, "Mr. Lincoln what was the first thing you did after your mother died?" The pretend spirit answered, guessing, that he had gone to his room, feeling low, and was incommunicado for days. When Weiss informed the medium that, instead, Lincoln had asked a clergyman to conduct a burial service at her grave, the medium afterward confessed that he was like all the other spiritualists: "They're tricksters—every one of them." (See Houdini's "How I Unmask the Spirit Fakers," *Popular Science*, November 1925.)

Despite such debunkings, paranormal claims about the sixteenth president remain resistant to evidence and reason. Many want to believe that Lincoln lives on, beyond merely the immensity of his legacy.

Having followed in Houdini's footsteps, I once proved, for example, that a spirit slate, bearing a purported message from Lincoln, was a crude fake. I demonstrated that the chalked handwriting and signature were positively not his, and then turned to forensic linguistics: The text suspiciously used the archaic *thy*, which is uncharacteristic of Lincoln but a common ploy adopted by writers seeking to impart a lofty tone. And the grammatical error of using *should of* for *should have* would never have come from the hand of Lincoln. (See my *Adventures in Paranormal Investigation*, 2007, 39–47.)

Finally, Selzer presents the ghosts of Lincoln and those associated with him—his assassin, John Wilkes Booth, for instance, and Mary Surratt, who was hanged with three other conspirators. So numerous are the places where Lincoln's ghost has allegedly appeared (including some where he had never been) Selzer must ask, "who says a person can only have one ghost?"—especially if "a person could leave behind traces of himself that people might be able to pick up all over the place" (9–10). But it is surely frivolous to multiply ghosts when not a single one has ever been validated by science.

In any event, there are too many sites to comment on here. Many of them are in Washington, D.C., the most important being the White House (for which again see my "Paranormal Lincoln"). Another is the Lincolns' home in Springfield, Illinois, the only one Lincoln ever owned. (My wife Diana and I visited there a decade ago.) For years, a rocking chair in Mary's bedroom was sometimes witnessed to rock on its own—whether by her ghost or her husband's could only be speculated. As it happens, the curator reports that a security guard admitted on her retirement that she had secretly used fishing line to produce the ghostly effect for visitors (257).

Despite such debunkings, paranormal claims about the sixteenth president remain resistant to evidence and reason. Many want to believe that Lincoln lives on, beyond merely the immensity of his legacy. And writers are willing to profit from that urge. Adam Selzer's *Ghosts of Lincoln* is by no means the worst offender. ■

Joe Nickell, PhD, did graduate work (both coursework and independent studies) in folklore. Among his many investigative books is *The Science of Ghosts*.

Invasion of the Pod People

ROBERT SHEAFFER

Walking Among Us: The Alien Plan to Control Humanity. By David M. Jacobs. San Francisco: Disinformation Books, an imprint of Red Wheel/Weiser, LLC, 2015. 280 pp, $21.95.

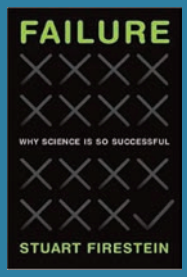
The plot of the 1956 cult science fiction film *Invasion of the Body Snatchers* is summarized on the Internet Movie Database: "A small-town doctor learns that the population of his community is being replaced by emotionless alien duplicates." This, in a nutshell, is what Jacobs alleges to be happening in *Walking Among Us*, except that the aliens do not steal our whole bodies, just our DNA (which they use to grow their own versions of our bodies). They produce emotionless alien hybrids, who now walk among us. We read on the back page of the book: "A silent and insidious invasion has begun. Alien hybrids have moved into your neighborhood and into your workplace. They have been trained by human abductees to 'pass,' to blend in to society, to appear as normal as your next door neighbor."

David M. Jacobs, PhD, is a retired professor of history at Temple University in Philadelphia, Pennsylvania. He has been studying the UFO phenomenon since the 1960s and has been hypnotizing supposed UFO abductees since 1986, a skill he learned from his fellow abductionist, the late Budd Hopkins. In the early 1990s, abduction mania was riding high, led by its troika of Dr. John Mack, a respected Harvard psychiatrist; Budd Hopkins, artist and amateur hypnotist; and Jacobs. It resonated well with other concurrent manias, such as "recovered memories" of alleged satanic cult molestations, large-scale daycare molestations, etc. In 1992, CBS-TV ran a primetime miniseries based on the claims in Hopkins's book *Intruders*, fueling widespread fears of sinister alien abductions. The troika was so confident about the "scientific" status of their findings that in 1992 they arranged an Abduction Study Conference at MIT, hosted

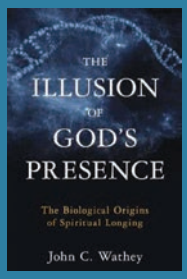
NEW AND NOTABLE]

Listing does not preclude future review.

GOD IS WATCHING YOU: How the Fear of God Makes Us Human. Dominic Johnson. Scientific skeptics often wonder how religious belief prevails so widely. Dominic Johnson, who holds a DPhil from Oxford in evolutionary biology as well as a PhD from Geneva University in political science, presents the case that religion—and specifically the fear of supernatural observation and punishment—is an evolutionary adaptation. He says the idea of supernatural retribution has helped preserve moral order and achieve remarkable levels of cooperation. His book seeks to show that belief in supernatural reward and punishment is no quirk of western or Christian culture but is a ubiquitous phenomenon of human nature that spans all cultures; second, he argues that this is no accident but is an evolutionary adaption; and third, he asks us to think through the implications of all this. His valuable exploration into the evolutionary reasons for the power and pervasiveness of religious belief raises troubling issues for us all. Oxford University Press, 2015, 304 pp., $27.95.



FAILURE: Why Science is So Successful. Stuart Firestein. A sequel to his 2012 book *Ignorance: How It Drives Science*, Firestein notes aptly that although ignorance and failure are commonly seen in a negative light, "in science they are just the opposite: they are where the action is." Modern science is an idiosyncratic, often bumbling search for understanding in uncharted territories, full of wrong turns, dead ends, and the occasional remarkable success. Firestein, professor and former chair of the Department of Biological Sciences at Columbia University, explores this view in a series of informal stereotype-breaking essays on how science is actually done. Oxford University Press, 2015, 286 pp., $21.95.



THE ILLUSION OF GOD'S PRESENCE: The Biological Origins of Spiritual Longing. John C. Wathey. The intuitive sense of God's presence, even more so than rituals or doctrines, anchors religious faith. Wathey, a computational biologist and neuroscientist, explores the biological origins of this compelling feeling, attributing it to innate neural circuitry that evolved to promote the mother-child bond. As the infant grows into adulthood this feeling is transferred to the realm of religion, where it is reactivated through the symbols, imagery, and rituals of worship. Prometheus Books, 2015, 445 pp., $28.00.

PARANOID: Exploring Suspicion from the Dubious to the Delusional. David J. LaPorte. Paranoia—where the needed quality suspicion becomes excessive and unfounded—seems nearly ubiquitous today, with various bombings and other mass carnages frequently committed by individuals who show classic signs of paranoia. And you can easily find paranoia in talk radio and other public forums. David LaPorte, a professor of psychology at Indiana University of Pennsylvania, describes exactly what paranoia is, how and why it manifests, and the forms it takes, including stalking, pathological jealousy, and even militia movements. LaPorte agrees that despite the fact that paranoid behavior goes far back in human history, our post-9/11 world has become a fertile environment for paranoia and its often-destructive consequences. Prometheus Books, 2015, 290 pp., $18.00.

—Kendrick Frazier

by physicist David Pritchard, in which I participated representing CSICOP. However, they went to extraordinary lengths using "non-disclosure forms" to control how the conference was reported. While the participants were heavily slanted toward the pro-abduction view, there was a significant presence of skeptical professionals, and instead of solidifying the abductionists' claims, the conference highlighted their glaring weaknesses.

Jacobs's first abduction book was *Secret Life* (1992), which attempts to categorize what goes on during a typical UFO abduction: physical events, reproductive events, and neurological events—"manipulating emotions, thoughts, and images . . . I found that aliens could cause women to have orgasms during staring procedures." His second abduction book, *The Threat* (1998), focused on supposed alien "hybrids and their roles in the abduction phenomenon," especially "human-looking hybrids who involve themselves with abductees for years."

In this book, Jacobs explains in detail about the different kinds of aliens:

- "Insectalin" leaders, who are over six feet tall and look like a praying mantis.
- "Grays," large and small, who "only communicate telepathically."
- "Reptilian hybrids," with "snake-like" heads and mottled skin.
- "Humanoid hybrids" (early, middle, and late stage); leading ultimately to:
- "Hubrids," who are "human in every way except in specific neural functions," capable of both "telepathic and verbal communication."

It is these "hubrids" that are supposedly infiltrating human society today.

Much of *Walking Among Us* consists of tedious recounting of supposed abduction experiences elicited during hypnosis sessions. The aliens are presented as robotic, humorless, and bewildered by everyday devices such as telephones, as well as by human social conventions.

Ever the fatalist, Jacobs laments:

> If enough intelligent, knowledgeable people put their minds to the problem, there may be a remote possibility that they can stop the aliens, or at least slow them down. But something of that nature will not be realized as long as academics, scientists, and especially neuroscientists . . . not only disregard the abduction phenomenon, but think it to be a direct indication of mendacity or mental instability.

It is these "hubrids" that are supposedly infiltrating human society today.

Yet what repeatedly struck me in reading this was *Jacobs's utter lack of curiosity* about tracking down, and exposing, the alien presence and activities that he says is going on all around us. For example, one abductee was reportedly met outside her house and "driven by two late-twenties advance hubrids in their car" to their apartment. It was "a different apartment from the one she had entered before." So, alien hubrids drive cars. Do they have driver's licenses? They must, for they could not risk the scrutiny from law enforcement were they to drive without one. (Although I suppose Jacobs could claim that the hubrids would use their alien mind powers to make the traffic officer not pull them over.) How do aliens obtain documents to get their drivers licenses? How do they pay for them? Who pays for the cars driven by aliens? Who pays for their apartments? How do they pay when they go into a bar? How do saucer aliens obtain money—do they rob banks or mine gold in asteroids? After a hubrid stops by for a visit, why not try to swab some DNA from the drinking glass he used? Given a few leads, any decent private investigator ought to be able to track down these infiltrators quickly enough—and expose the alien agenda! Yet Jacobs has absolutely no interest in such investigations; it's almost as if he knows this is all a paranoid fantasy, and he doesn't want to risk confronting that fact by examining his own claims too closely.

Mack was struck by a vehicle and killed in 2004. Hopkins died in 2011, after having been publicly humiliated by the shocking exposé of his dishonest methods by his ex-wife and former collaborator, Carol Rainey (https://goo.gl/I1d4WS). This leaves Jacobs as the last survivor of the once-mighty UFO abduction troika, but his star is now quite tarnished too. His dealings with a supposed abductee known as "Emma Woods" have been harshly criticized by other UFO researchers. I can't get into all of the details here, but it involves things such as Emma's undergarments and Jacob's purchase recommendations at a kinky sex shop. Her website is at http://www.ufoalienabductee.com. On Jacobs' website (http://www.ufoabduction.com), he has a response to what he calls the "defamation campaign" against him. Referring to "Emma" as "Alice," Jacobs says that she appears to suffer from "Borderline Personality Disorder" and that she has been experiencing an "emotional breakdown."

In the final chapter Jacobs finally acknowledges, "Most abduction evidence is the result of human memory, retrieved through hypnosis, with all its problems, administered by amateurs like myself." Having made this candid admission, the next sentence ought to say something like, "So don't take anything in this book too seriously." Instead, like other abductionists who have paid lip service to the fallibility of hypnosis and memory, Jacobs conveniently ignores it throughout the entire book and uses the dubious results of amateur hypnosis sessions to reach astonishing conclusions. ■

Robert Sheaffer has been critically examining questionable UFO claims and their claimants for decades. SI's longtime "Psychic Vibrations" columnist, he is author of *UFO Sightings: The Evidence* (Prometheus Books).

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'Post-Materialist' Science? A Smokescreen for Woo
Science and the Pope's Encyclical
Evidence-Free Enterprise: NCCAM's Business Grants
The Future of CFI

Correlations and Causation

Kudos to Dr. Morton E. Tavel for his article "Correlations: How Do We Ever Establish Definite Causation?" in SI (September/October 2015, pp. 54–55). His reference to Hill's 1965 report by example reinforced grounds for crucial conditions in cause-effect assumptions regarding the linkage between cigarette smoking and cancer. The query from Jim Jackson regarding "correlation is not causation" is raised often in classrooms and scientific critiques. Yet the quotation minimizes the probability that under bounded conditions, as explained in Tavel's article (e.g., see Hill's seven guidelines, point 2 "Consistency of association," p. 55), correlation may be one indicator of "causation." That is, if all *known* controls are implemented and *if* a statistical level of significance ($p < .001$) is agreed upon, then independent and dependent variables would be *both* correlated and *assumed* causally related.

In effect, then, the phrase, namely, "correlation is not causation" should be modified. A qualified expression is as follows: *correlation does not guarantee causation*. At issue are necessary (correlated) and sufficient (controlled) conditions. Essentially, "causation," even with appropriate controls, is a tentative, statistically probable conclusion. Yet future research may reveal unexpected, extraneous intervening variables that require additional controls and re-evaluation. As British-Empiricist philosopher David Hume asserted, causality is couched in the probabilities of events, not in certainty (paraphrased).

William F. Vitulli, PhD
Professor Emeritus of Psychology
University of South Alabama
Mobile, Alabama

Aristotle and Evidence

May I point out a minor error in Professor Hassani's otherwise excellent article, "'Post-Materialist' Science? A Smokescreen for Woo" (September/October 2015). Professor Hassani states: "Sixteenth-century Europe saw the revival of science after a 1,800-year hiatus. There emerged two schools of thought. One school followed Plato and Aristotle and advocated primacy of the mind. The other emphasized the importance of observation . . . etc."

According to Armand Marie Leroi, professor of developmental biology at Imperial College London, in his book titled *Lagoon: How Aristotle Invented Science*, Aristotle discounted the Platonic worldview and sought throughout his life work to base his conclusions upon observation and empirical evidence. Indeed, Aristotle did not flinch from attacking the Platonists when the mood took him. While many of Aristotle's observations and the conclusions he drew from them were understandably misplaced and, more often than not, wrong, nonetheless the thrust of his efforts was not based on a "primacy of the mind" but rather an approach to scientific research that modern investigators would clearly recognize.

As a subscriber for the past thirty-nine years, first in Canada and now in the United Kingdom, I continue to appreciate the excellent content of Skeptical Inquirer of which Professor Hassani's article is an exemplar.

Michael J. Reynolds
Somerset, United Kingdom

Sadri Hassani responds:

I appreciate Mr. Reynolds's comments on my article and have read his letter with deep interest. Aristotle was, as Mr. Reynolds points out, interested in observation but not in a way that modern scientists are. His observations were extremely casual, and their worth lay in how much philosophical discussion they could generate. After all, he was the most notable student of Plato, who chided geometers for drawing figures on sand instead of relying entirely on their minds to prove geometrical theorems. Thus, even though "Aristotle discounted the Platonic worldview," he could not entirely rid himself of the master's influence.

As a physicist, I can only comment, with a fair degree of confidence, on his Physics. *The tome is composed of eight books. In Books I–IV, Aristotle spends pages upon pages defining motion (which, by the way, includes the healing of the wound, the heating of the cold, the lighting of the dark, and, of course, the galloping of a horse), making philosophical arguments against his opponents' views on motion, defending his interpretation of motion, classifying motion, disproof of the physical existence of the infinite, and a long philosophical discussion of space, time, and the void. He is particularly keen to argue against the existence of the void. As he did not accept the atomic hypothesis, of which the void was an integral part, Aristotle regards compression and expansion, not as the motion of atoms in the void but as a transformation of one part of a universal matter into another. Thus, when one compresses air into a smaller volume, another part of the universal matter, possibly far away, bulges out. Books V and VI are further elaboration on the classification of motion and rest.*

It is not until the end of Book VII—and thus very near the end of Physics*—that we encounter a real discussion of motion, the kind that should be presented at the very beginning: movement of real objects. Here Aristotle tries to be slightly less general and more quantitative. He argues—in the purest philosophical connotation of the word—that the speed of an object is proportional to the force acting on that object. The law is entirely speculative. Had Aristotle, ever so informally, tried his hypothesis on a real moving object, he would have immediately caught the error in his equation. He would have discovered that if a force (such as the push of one man) acts on an object and moves it on a floor with constant velocity, then the addition of an equal force (such as the push of an additional man) does not cause the velocity of the object to double instantaneously as the law suggests but accelerates the object slowly, not just to twice the velocity but to greater and greater speed.*

Bertrand Russell summarizes Aristotle's attitude toward observation succinctly in his The Impact of Science on Society *(available online at https://ia600300.Zus.archive.org/0/items/TheImpactOfScienceOnSociety-B.Russell/TheImpactOfScienceOnSociety-B.Russell.pdf–see page 7): "Aristotle maintained that women have fewer teeth than men; although he was twice married, it never occurred to him to verify this statement by examining his wives' mouths."*

GMOs: Promise, Potential, Perils?

The following is from the section "GMO's: Potential and Promise" in your conference report describing Michael Specter's speech at the CFI Conference (SI, September/October 2015, p. 14): "Roundup replaced two other products that were far more toxic."

We thus have the recognition, tacitly stated, that Roundup

is toxic . . . its residues are not something that you, or I, or Michael Specter would want to have on the food we eat. The question, therefore, is, "Are farmers more likely to spray Roundup on crops that are genetically resistant to Roundup than on those that are not?" The answer, of course, is an unequivocal "yes."

So, it follows that the consumer is more likely to ingest Roundup from a crop that is resistant to the herbicide than from one that is not so resistant.

Frankly, I don't care whether that resistance is the result of a long process of natural selection or is due to genetic modification, and there's the rub since resistance is easily and quickly established—and has been established—by genetic modification. I have no objection to genetic modification of Christmas trees to make them bushier, but it's safer and makes more sense for all products containing GMOs to be so labeled.

What's wrong with providing full information to the public and letting them decide?

John A. Broussard
Kamuela, Hawaii

Though I find myself very much in sympathy with SI's basic stand, one area of disagreement is about genetically modified food. I have to admit straight away that I feel distrustful of it, and wonder about long-term impacts that testing may not have revealed, but I'm not dismissive of the possible benefits of its development.

The main problem I have is with the reasoning often used to promote GMOs. It is argued that they will meet the needs of a growing world population and will benefit people who today go hungry in less developed countries. These arguments don't seem convincing.

In the first place, is finding ways to produce more food the best response to a growing global population? Shouldn't the stress be on reducing population growth and even reversing it by incentivizing people to have fewer children and enabling them to follow through on that choice? Otherwise, increasing food production will simply buy time while the global population continues to rise and needs yet more food to be produced.

In the second place, the production of genetically modified foods is a business, not a work of charity. During most famines in modern times, people have not gone hungry and died because there wasn't enough food in the world; they died because either food wasn't available where those in need lived or because they did not have the money to pay for it. Why should foodstuffs be more available to people in this position if they are GM products than if they aren't?

For farmers in poor countries, the advantages are by no means obvious. What are they to do if they don't have money to invest in the new products and little or no collateral to obtain loans? Isn't there a strong possibility that the benefits will be concentrated in the hands of wealthier farmers who have the money to invest in GM seeds and the acreage to produce a large marketable crop efficiently, squeezing out other farmers who can produce only a small surplus?

It could be argued that this is a matter of social policy and has nothing to do with the scientists working on GMOs, who have no control over how the products of their work are used, but that smacks of irresponsibility.

John Gee
Singapore

Michael Specter wrote that critical thinking and appreciation of science are needed when judging GMOs. Specter also wrote that he likes Monsanto and approves of using GMO seeds in agriculture.

In 2000 and 2004, the National Academy of Sciences reviewed GMO safety in crops and concluded they were not unique hazards to human health. Both reports concluded that GMOs might change nutritional quality of foods and have the potential to make unanticipated allergens (toxins). Both reports recommended developing new risk-assessment tools and postmarketing surveillance. Neither recommendation has been followed.

Herbicide resistance is the main characteristic biotechnology introduced into plants. GMO crops are resistant to herbicides either because they have pesticides inserted in their genes or have been made able to resist herbicide field spraying. In growing GMO crops, fields are sprayed heavily with pesticides. The foods produced have more pesticides in them; pesticides are poisonous to living organisms (including human cells).

Since 2004, there is new evidence that low pesticide doses can cause harm to humans. Possible adverse health effects are linked to cancer, diabetes, obesity, poor fetal development, kidney toxicity, and inheritable chromosomal damage. GMO crop fields are now threatened by "super weeds" that cannot be killed by existing herbicides. There is developing evidence that GMOs are the primary cause of collapse for beneficial insects such as pollinators, and other beneficial microorganisms.

The *New England Journal of Medicine* recently printed a front-page editorial critical of GMO plant threats to human health. You can read an article on this if you Google "GMO Safety: Physicians Take On the Biotech Industry."

It is time now to require foods sold to be labeled if they contain GMOs. Data cannot be collected if the presence of GMOs is unknown. It is also time to develop new risk-assessment tools and new postmarketing surveillance.

Martha E. Martin
Paia, Hawaii

There is no reason GM foods should be considered safe for consumption because we just don't know enough about them. Remember DDT, lead-arsenic, leaded paint and gasoline, Thalidomide, PCB's, asbestos, tobacco products, and on and on. They were all thought to be safe at one time and were commonly used products.

Michael Specter skillfully presents the need for GMOs in what first appears as science-based information. On closer review, it appears that he uses inferences and psychology to influence the reader. He states, "society's unfortunate view seems to be that scientists are concocting 'some Martian-like different species,'" but this is exactly what is happening. For the past 10,000 years humans have tinkered with plants and animals by "human selection," as opposed to "natural selection." GMOs are not a continuation of this process. A gene from one species is mechanically inserted into a different species. This is a whole new "ball game" and is not possible in nature.

The current consumer push back is not to take GM foods off the shelf, but to require GMO labeling. The consumer wants freedom of choice, not secrecy. The following countries require GMO labeling: Australia, EU, Japan, Brazil, and China, and they don't seem to be having any problems as a result. "Methinks Michael Specter doth protest too much" and gives himself away.

Vernon Klavon
Fresno, California

Who's an Expert on Climate?

In your report on the Climate Change Panel at your recent "Reason for Change" conference (September/October 2015, p. 17), one speaker belittles "think tank experts" as having no scientific training. Yet, further on in the CSI vs. Heartland challenge, last paragraph on p. 19, you promote the views of such science

luminaries as:

Bill Nye, mechanical engineer
Ann Druyan, author
Richard Dawkins, biology
David Morrison, planetary astronomer
Harold Kroto, chemistry
Joe Nickell, investigator
Eugenie C. Scott, anthropology
Lawrence Krauss, physics/cosmology

With the possible exception of Krauss, *none* have a formal background in climate science. I find it very concerning that while you denigrate the training of anthropomorphic global warming skeptics, you casually toss out notable names with the obvious expectation that their notoriety alone is reason to take their opinions as applicable to the question.

Jerome Lane
Winchester, Virginia

Scott Mandia (the Climate Change panelist quoted but not named) replies:

Do I need a formal background in Newtonian mechanics to tell an audience why an apple falls from the tree? If, however, I tell people that gravity does not exist or that apples fall upward, then I certainly need the training to understand why classical physics is wrong. The burden falls on those who argue against the settled science that humans are causing global warming. Extraordinary claims require extraordinary evidence.

Child Abuse and Mental Disorders

In Dr. Harriet Hall's excellent review of Witkowski/Zatonski's book *Psychology Gone Wrong* in the July/August 2015 issue of SI, a paragraph stating that regarding the "contentious issue of child sexual abuse . . . Studies have found no correlation with adult mental disorders . . ." attracted my attention.

In over fifty years of practicing medicine, forty-plus years of which being an active practice of neurology, I have seen several dozen cases of dissociative pseudo-seizures. With an exception of one case (he refused to talk about it), all were victims of child sexual abuse, females outnumbering males by at least 20:1. I have not seen any studies on the subject, but I think that my sample is large enough not to be simply dismissed as "anecdotal." Oh yes, being a lifetime skeptic, I could hardly be accused of confirmation bias.

Ivan Stanko, MD
Rothschild, Wisconsin

Harriet Hall replies:

Dr. Stanko is not the first to suggest a relationship between non-epileptic seizures and child sexual abuse. Studies have been done and they have found that a substantial percentage of patients with that diagnosis had been sexually abused. But a meta-analysis of thirty-four published studies (http://www.sciencedirect.com/science/article/pii/S0272735805001662) concluded:

While our statistical results support the professed link between child sexual abuse and non-epileptic seizures, we suggest that because of research design limitations, it is premature to draw any definitive conclusions regarding a relationship.

Limitations included things like the absence of comparison groups.

So I would argue that Witkowski and Zatonski's statement that "Studies have found no correlation with adult mental disorders" is essentially correct.

Cell Phone Warning Law

The conclusions conveyed by Benjamin Radford ("California Passes Cell Phone Warning Law" SI, September/October 2015) regarding the potential for cell phone harm is right on. The risk is virtually zero. However, there is a weakness in the column that might be easy pickings for the fear mongers. Mr. Radford's prose could easily be interpreted as a claim that all non-ionizing radiation is harmless, including sunlight. Almost everyone understands that sun exposure significantly increases skin cancer risk, and so might conclude that Radford's assertions are not trustworthy.

I don't think Radford meant to imply that sunlight exposure presents no health risk, but that is how I interpreted it the first two times I read it. It could have been worded more clearly. Otherwise the column is great and thank you for printing it.

Brad Bardwell
Usk, Washington

Response to Chelsea

I just reread Ben Radford's response to Chelsea ("A Skeptics Guide to Ethical Curse Removal," July/August 2015), who wrote to him about a curse that had been placed on her. It's easy to think such situations are hopeless, that no one can get through to the person who holds such silly beliefs. I'm in awe of his extremely intelligent, sensitive, and thorough response. He provided a blueprint for any of us to respond constructively to such beliefs, and her response shows his advice was useful—in her own words, the best advice she had received.

Becky Strickland
Secretary
Philadelphia Association for Critical Thinking

Why Religions Exist

I agree with everything that Gene White wrote under the heading of "Why Belief?" (Letters, September/October 2015) but can think of a few other reasons why religions exist.

Today, it's big business. A minister/pastor/rabbi of a normal-sized congregation is earning in the high five figures with generous benefits, including health care and retirement. In the mega-churches, they are making well into six figures and, of course, the TV evangelists into the millions.

Also, religion is a way of controlling the behavior of its followers. You could debate whether this is planned or just a logical outcome.

I look forward to the day when science provides compelling evidence of life outside the earth, whether it's via SETI or the Kepler Telescope or new data on Titan or Io. It will be very interesting to see how the world's religions absorb and attempt to explain it.

Brooks Rimes
Grand Island, New York

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

SKEPTICAL ANNIVERSARIES

by Tim Farley

January 3, 2006: On a live radio program, Sylvia Browne predicts the miners trapped in the Sago Mine would be found alive. Minutes later she is proven wrong on the air.

January 5, 2011: The *British Medical Journal* publishes a Brian Deer investigation into Andrew Wakefield's 1998 MMR research and dubs the research an "elaborate fraud."

January 15, 1881: The first issue of *Maandblad tegen de Kwakzalverij* (*Monthly against Quackery*) of the Dutch Society against Quackery is published.

January 24, 1986: Scientology founder L. Ron Hubbard dies, but the church announces that he has merely "dropped" his body to continue his research on another planet.

January 28, 1911: The Kansas Chiropractic Association is founded. Two years later it succeeds in lobbying Kansas to become the first state to license chiropractic practitioners.

February 6, 1921: Spiritualist Thomas Lynn Bradford commits suicide, intending to speak through a medium after his death. The suicide was successful, but the subsequent communication not so much.

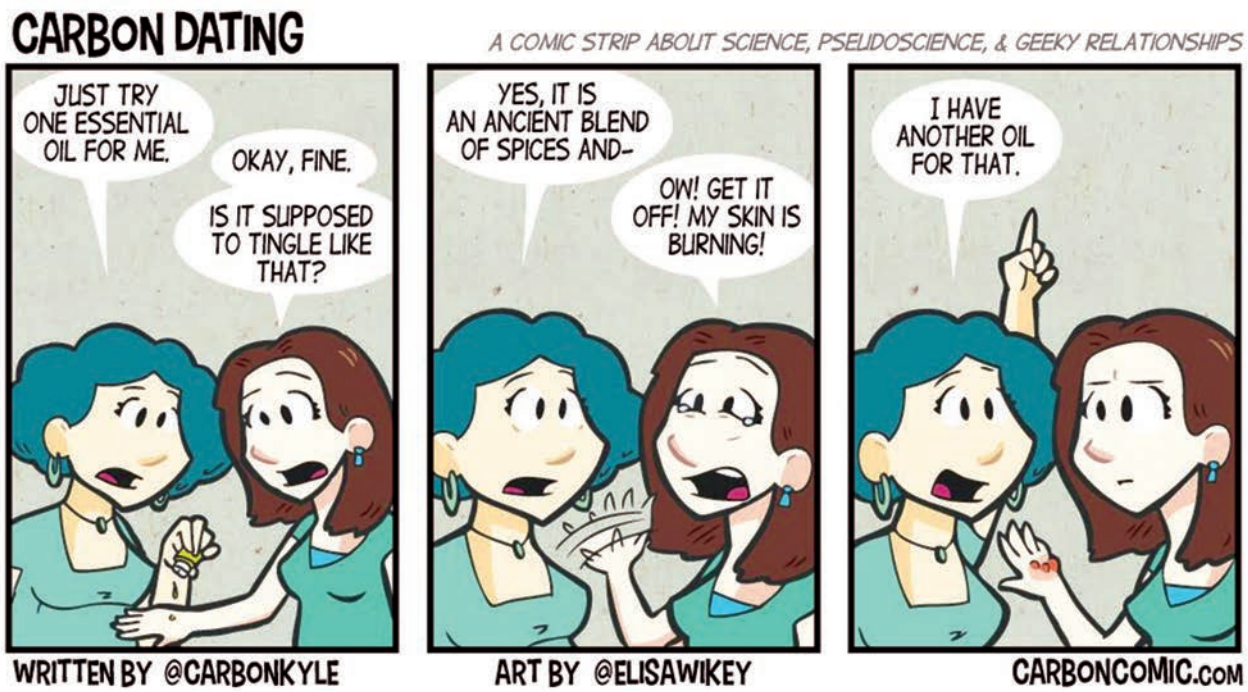
February 6, 1986: New Zealand skeptic organization NZCSICOP is founded by Dennis Dutton and David Marks.

February 10, 1891: The U.S. Patent Office issues design patent 446,054, for the first modern Ouija board with the alphabet printed on it.

February 23, 1986: A group of Bay Area skeptics gather to assist James Randi in an investigation of Peter Popoff at the latter's appearance in San Francisco. (It was documented in the Fall 1986 Skeptical Inquirer.)

February 25, 1866: The Calaveras Skull is found by miners. Josiah Whitney claimed it proved humans coexisted with Pliocene mastodons in California. It was later shown to be a hoax.

Tim Farley is the creator of the website whatstheharm.net. and blogs at skeptools.com. He is a past fellow of the James Randi Educational Foundation.


CARBON DATING
A COMIC STRIP ABOUT SCIENCE, PSEUDOSCIENCE, & GEEKY RELATIONSHIPS
JUST TRY ONE ESSENTIAL OIL FOR ME.
OKAY, FINE.
IS IT SUPPOSED TO TINGLE LIKE THAT?
YES, IT IS AN ANCIENT BLEND OF SPICES AND-
OW! GET IT OFF! MY SKIN IS BURNING!
I HAVE ANOTHER OIL FOR THAT.
WRITTEN BY @CARBONKYLE
ART BY @ELISAWIKEY
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Science & Reason, Hampton Rds., Virginia. Lawrence Weinstein, Old Dominion Univ.-Physics Dept., Norfolk, VA 23529

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Seattle Skeptics
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The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous.
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International affiliated organizations listed at www.csicop.org.

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